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# NARCOTIC PLANTS AND STIMULANTS OF THE ANCIENT AMERICANS

BY

W. E. SAFFORD

*Economic Botanist, U. S. Department of Agriculture*

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FROM THE SMITHSONIAN REPORT FOR 1916, PAGES 387-424  
(WITH 17 PLATES)



(PUBLICATION 2466)

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# NARCOTIC PLANTS AND STIMULANTS OF THE ANCIENT AMERICANS.<sup>1</sup>

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By W. E. SAFFORD,

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[With 17 plates.]

The use of narcotic plants and stimulants was widely spread in both North and South America long before the discovery, not only for the purpose of exhilaration or intoxication, but also in connection with the practice of necromancy and in religious rituals and ceremonies accompanying the initiation of boys into the status of manhood. The companions of Columbus on his first voyage observed the custom of smoking cigars made of bundles of tobacco leaves as practiced by the aborigines of Hispaniola, or Haiti, and the same custom was observed on the Isthmus of Panama. The use of this plant was found to be very widely spread on the mainland of both North and South America. In Mexico tobacco was used in religious rituals like incense, and its leaves were chewed with lime. Though of subtropical origin, its cultivation extended as far north as the St. Lawrence River. The antiquity of tobacco smoking in North America is attested by the discovery of ceremonial tobacco pipes in prehistoric mounds and graves.

A narcotic snuff called cohoba, described by Ramon Pane, who accompanied Columbus on his second voyage, has been confused with tobacco. It was used by the natives of Hispaniola, who inhaled it through the nostrils by means of a bifurcated tube. Snuff similarly inhaled was afterwards found among several Indian tribes of South America. It proved to be a powder prepared from the seeds of a mimosalike tree, *Piptadenia peregrina*, to be described below.

Among the Aztecs, in addition to tobacco, two other narcotic plants, a small, fleshy spineless cactus mistaken by early writers for a fungus from the appearance of its dried discoid sections and the seeds of a species of *Datura* called *ololiuhqui*, were used by priests and magicians in their incantations. So holy were these plants held that collectors sent in quest of the cactus (*peyotl*) were consecrated with incense before starting on their journey, and it was

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<sup>1</sup> Published by the authority of the Secretary of Agriculture.

considered a pious task to sweep the ground where the *ololiuhqui* grew. Among the *Zuñis* and the Indians of Arizona and Southern California the roots and other parts of a closely allied *Datura* were used in incantations and initiatory ceremonies. Among the Indians of Virginia the common *Datura stramonium* was used in a similar ceremony (*huskinawing*) to cause intoxication of candidates for initiation; and it is interesting to note that in the Andes of Peru a related tree datura, *Brugmansia sanguinea*, was used by the priests of the Temple of the Sun to induce exhilaration accompanied by supernatural visions.

Other narcotic plants belonging to the *Solanaceae*, or Nightshade Family, allied to the *Mandragora* and *Hyoscyamus* of the Old World, were species of *Solandra*, resembling climbing daturas with long trumpet-shaped flowers; *Himeranthus* and *Jaborosa* of South America, used as aphrodisiacs and in religious ceremonies; *Salpichroa* and *Acnistus*, with properties like those of *Atropa Belladonna*; and, in addition to these, a South American forest climber belonging to the *Malpighiaceae* described by Richard Spruce under the name *Banisteria Caapi*.

Among nerve stimulants used by American aborigines must be mentioned first of all *Erythroxylon Coca*, now of great importance as the source of cocaine; *Ilex paraguariensis*, the yerba mate, or Paraguay tea, and its very close ally of our Southern States, *Ilex vomitoria*, the basis of the celebrated "black drink"; *Theobroma Cacao*, from which chocolate is made; and *Paullinia Cupana*, the source of the cupana or curaná, of South America, which acts, somewhat like tea, as a wholesome stimulant.

Among alcoholic intoxicants were *chicha* or *azua*, prepared by fermenting gruel made from grains of maize or chenopodium, to which various fruit juices were sometimes added; *tizwin*, or *teshuino*, made by our southwestern Indians from sprouting maize or other grains, and also from mezquit pods or cactus fruits; and a fermented drink prepared in South America from the roots of *mandioca*. From the sap of certain species of palms wine was made in various parts of tropical America, and from century plants, or agaves, and yuccas the Mexicans made their fermented *octli*, or *pulque*. The art of distilling was unknown in ancient America, but with the fermented liquors above mentioned, often strengthened by narcotic herbs, roots, or seeds, many of the aboriginal tribes succeeded in "getting gloriously drunk," as one of the early Spanish writers declared. Some of them were addicted to most disgusting forms of debauchery long before they came under the degrading influence of civilization, so often deplored by travelers and missionaries.<sup>1</sup>

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<sup>1</sup> See Spix and Martius. *Reise in Brasilien*, 3:1075. 1831; and Robert Southey, *History of Brazil*, 3:722-723. 1819.



## TOBACCO.

(Plates 1 and 2.)

Tobacco is first mentioned in the account of Columbus's discovery of the New World. In the narrative published by Navarrete, under the date of November 6, 1492, is the following entry:

Last night, says the admiral, came the two men whom he had sent to observe the interior of the island, and they told him how they had walked 12 leagues to a village of 50 houses. \* \* \* On the road the two Christians encountered many people proceeding to their villages, men and women, holding in their hands a firebrand and herbs which they were accustomed to take in their incense burners.

In a footnote on the same page is added:

In the *Historia general de las Indias* which he wrote, Bishop Casas refers with greater detail to this occurrence. "These two Christians met on the road (says he) many people who were proceeding to their villages, women and men, always the men with a firebrand in their hands and certain herbs to take in their incense burners, which are dry herbs wrapped in a certain leaf, also dry, after the manner of a musket made of paper which the boys make at the feast of Pascua del Espiritu Santo; and having lighted one end of it, at the other they suck or inhale, or receive within with the breath, that smoke, with which the body is soothed and which almost intoxicates, so that they do not feel fatigue. These muskets, or whatever we shall call them, they call tabacos. I knew Spaniards on this island of Hispaniola who were accustomed to taking them, and, being reproached for so doing because it was a vice, they replied that they could not stop the habit. I know not what savor or benefit they found in them. Here may be seen the origin of our cigars. Who would have ventured to say at that time that their consumption and use would one day become so common and general and that upon this new and strange vice there would be established one of the fattest revenues of the State?"<sup>1</sup>

## USE OF TOBACCO BY THE MEXICANS.

By the ancient Mexicans tobacco was regarded as a sacred or magic herb. It was used in their religious rites and in ceremonies of various kinds in the form of incense. They also inhaled its smoke and chewed its leaves together with lime. In the Nahuatl language it was called yetl, as prepared for their fumigations it was called picietl; and the leaf of green tobacco together with lime, prepared for chewing was called tenexietl (from tenextli, lime, and yetl, tobacco). The last name is often modified into other forms, varying even in the writings of a single author, as tenegiete, tenechiete, etc., the Nahuatl X having the sound of the English SH (which is absent from the Spanish language), and the Spaniards having a tendency to drop the terminal L of Nahuatl words.

The plant itself, *Nicotiana tabacum*, was described by Dr. Nicolas Monardes of Seville, in 1574, and highly recommended by him for its

<sup>1</sup> Navarrete, *Collecion de los Viages de Descubrimientos, que hicieron por mar los Españoles desde fines del siglo XV.* Tomo. 1. Viages de Colon: Almirantazgo de Castilla. pp. 50-51. 1825.



supposed medicinal virtues. After enumerating a long list of maladies which might be cured by it, and relating specific instances in which he had known it to be efficacious (very much after the manner of the testimonials published at the present day in connection with patent medicines), he describes its ceremonial use by the Indian priests, or necromancers. In this connection, however, since he speaks of its intoxicating effects, it is very probable that other narcotics were mixed with it. The custom of chewing it, as practiced by the Mexicans, he describes as follows:

The Indians make use of tobacco to aid them to endure thirst as well as hunger, and to enable them to pass days without having necessity to eat or drink. When they have to journey across some desert or wilderness where neither water nor food is to be found, they use little pellets made of this tobacco. They take the leaves of it, and chew them, and as they go chewing them they go mixing with them a certain powder made of burnt clam shells, and go mixing them together in their mouth until they make a kind of paste, out of which they make little pellets a little larger than garbanzos and place them in the shade to dry, after which they keep them and use them in the following manner:

When they are obliged to journey in regions where they do not expect to find water or food, they take one of those pellets and place it between the lower lip and the teeth, and they go along sucking it all the time that they are walking, and what they suck they swallow, and after this fashion they pass and journey three or four days without having necessity for food or drink; because they feel neither hunger nor thirst nor faintness which might hinder their journey.<sup>1</sup>

Padre de la Serna, who prepared a manual for instructing the missionaries sent to the Indians concerning witchcraft, necromancy, and idolatry, as practiced by the payni and titzitl of the Mexicans, speaks repeatedly of the use of tobacco (picietl) and lime-and-tobacco (tenexietl) in their various conjurations. This plant, to which the Mexicans ascribed divine honors, was invoked like the sacred ololiuhque and peyotl, which will be described later. In all cases the spirits of the plants, designated as brown or green or white, were called upon to cast out various maladies, also distinguished by colors, with threats if they failed and promises if they succeeded. In classifying these narcotics Padre Serna observes:

They called by the name of "green spirit" the tenegiete [tenexietl] which they prepared with lime, in order to give strength to the mouth, venerating it as though it were the guardian angel of travelers. Tobacco, since it did not cause hallucinations, was not held to possess the virtues of divination like those of the narcotic ololiuhqui [Datura] and peyotl [Lophophora]. The latter were held in such reverence by certain persons "forsaken by God" that they were carried about to serve as charms against all injuries.<sup>1</sup>

<sup>1</sup> Monardes. "Historia medicinal de las Cosas que se traen de nuestras Indias Occidentales que sirven en Medicina." f. 30. 1574.

<sup>2</sup> See Jacinto de la Serna, "Manual de Ministros para el conocimiento de idolatrias y extirpacion de ellas." In Documentos Inéditos para la Historia de España, vol. 104, p. 165.



## USE OF TOBACCO IN NORTH AMERICA.

The antiquity of the custom of tobacco smoking in North America is indicated by the discovery of tobacco pipes in graves and burial mounds in various parts of the United States. Two of these pipes are shown in the accompanying illustrations (figs. 1, 2). They are but a sample of many, often fashioned in the shape of mammals, birds, or reptiles, and sometimes of human beings, found in the Scioto Valley, where the writer was born. It was the discovery of objects like these in the mounds near Chillicothe, Ohio, that first instilled in him an interest in study of the origin and history of the aboriginal inhabitants of America.

So widely spread was tobacco at the time of the discovery that, although a plant of subtropical origin, it was found in cultivation as far north as the St. Lawrence River. Indeed, one of the great tribes of North American Indians, known as the "Tobacco Nation," inhabited nine villages lying just south of Lake Huron. They took their name from the fact that they cultivated tobacco on a large scale and sold it to other tribes.<sup>1</sup>

The important part played by tobacco in many ceremonies of the North American Indians is too well known to need description in this place. In the South tobacco smoking often accompanied the ceremonial of the "black drink." At meetings of ambassadors, councils of nations, treaties of peace, and the reception of visitors, the calumet or pipe of peace was invariably circulated. The accompanying illustration (fig. 3) represents the stem of a ceremonial calumet, like that carried by Marquette during his travels among the Indians. In Virginia its cultivation was taken up on a large scale by the colonists.

Tobacco is undoubtedly the most important gift which America has presented to the world:



FIG. 2.—Stone pipe in the form of a human head from the same locality.



FIG. 1.—Stone pipe from Indian Mound, near Chillicothe, Ohio, representing a cedar bird.

No other visible and tangible product of Columbus's discovery has been so universally diffused among all kinds and conditions of men, even to the remotest nooks and corners of the habitable earth. Its serene and placid charm has everywhere proved irresistible, although from the outset its use has been frowned upon with an acerbity such as no other affair of hygiene has ever called forth. The first recorded mention of tobacco is in Columbus's diary for November 20, 1492 [Nov. 6, according to Navarrete]. The use of it was soon introduced

<sup>1</sup> It is interesting to note that in 1914 10,000,000 pounds of tobacco were produced in the Provinces of Quebec and Ontario.



into the Spanish Peninsula, and about 1560 the French ambassador at Lisbon, Jean Nicot, sent some of the fragrant herb into France, where it was named in honor of him Nicotina. It seems to have been first brought to England by Lane's returning colonists in 1586, and early in the seventeenth century it was becoming fashionable to smoke, in spite of the bull of Pope Urban VIII and King James's "Counterblast to Tobacco." Everyone will remember how that royal author characterized smoking as "a custom loathsome to the eye, hateful to the nose, harmful to the brain, dangerous to the lungs, and in the black stinking fume thereof nearest resembling the horrible Stygian smoke of the pit that is bottomless."<sup>1</sup>

In spite of all efforts to discourage its use and cultivation, tobacco soon became the principal staple of the New World, and was even

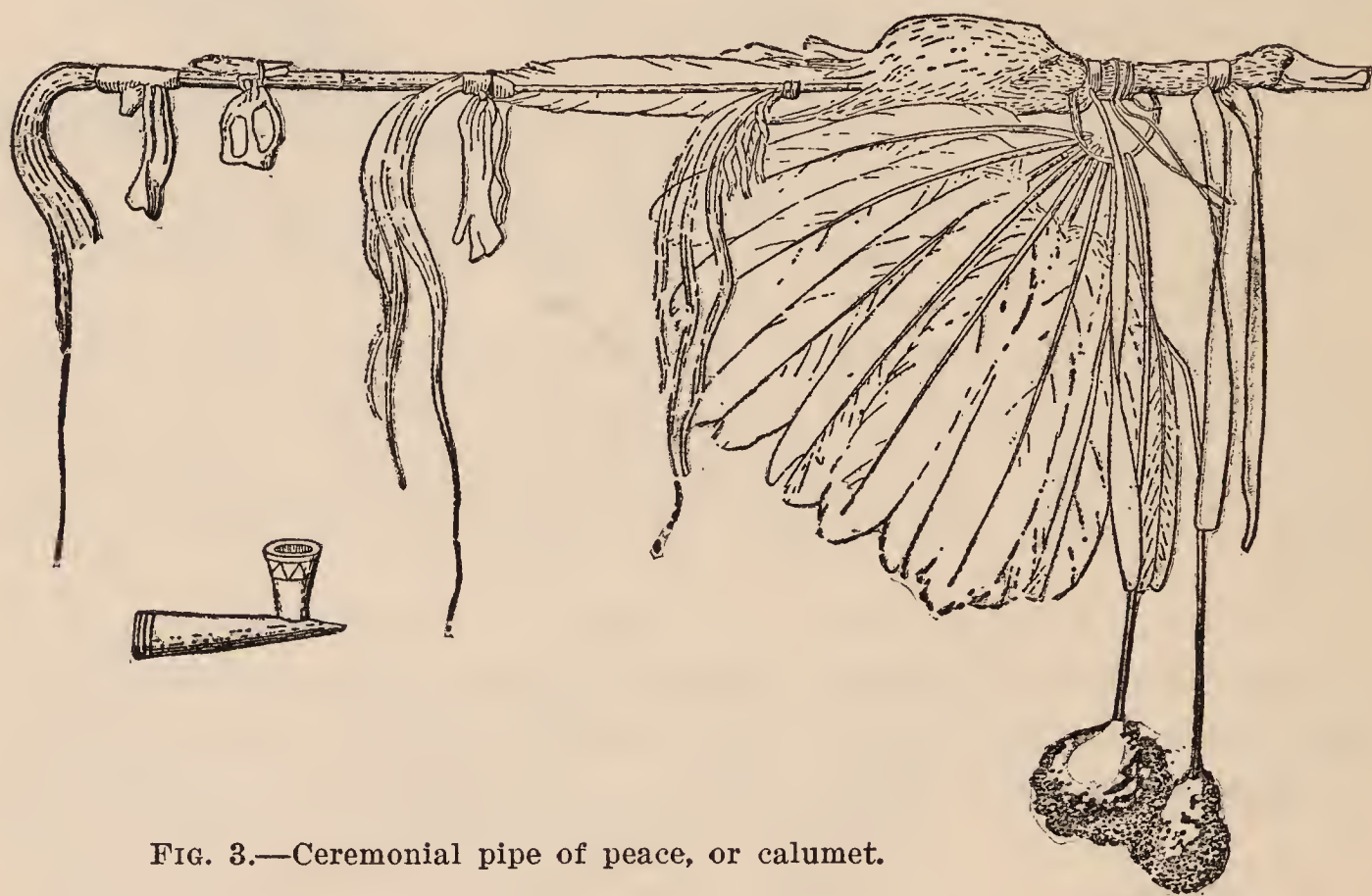


FIG. 3.—Ceremonial pipe of peace, or calumet.

used instead of gold and silver for currency. In 1619, owing to the scarcity of wives in Virginia a shipload of young women—

spinsters carefully selected and matronized (says Fiske) were sent to the colony. They had no difficulty in finding suitors, but no accepted suitor could claim his bride until he should pay the London Company 120 pounds of tobacco to defray the expenses of her voyage.<sup>2</sup>

Fiske calls attention to the important rôle which tobacco has played in the history of our country by repeating a remark of Moncure Conway: "A true history of tobacco would be the history of English and American liberty." Fiske continues:

It was tobacco that planted an English nation in Virginia. It was the desire to monopolize the tobacco trade that induced Charles I to recognize the House of Burgesses; discontent with the Navigation Act and its effect upon the tobacco trade was potent among the causes of Bacon's Rebellion; and so on

<sup>1</sup> Fiske, John. *Old Virginia and her Neighbors*, 1: 174-175. 1898.

<sup>2</sup> Fiske, *op. cit.*, 1: 188-189.



down to the eve of Independence, when Patrick Henry won his first triumph in the famous Parson's Cause, in which the price of tobacco furnished the bone of contention, the Indian weed has been strangely implicated with the history of political freedom.<sup>1</sup>

Such a certain and steady demand was there for it that, like chocolate in Mexico, it became the currency of the colony.

The prices of all articles of merchandise were quoted in pounds of tobacco. In tobacco taxes were assessed and all wages and salaries were paid. This use of tobacco as a circulating medium and as a standard of values was begun in the earliest days of the colony, when coin was scarce, and the structure of society was simple enough to permit a temporary return toward the primitive practice of barter. Under such circumstances tobacco was obviously the article most sure to be used as money.<sup>2</sup> It was exchangeable for whatever anybody wanted in the shape of service or merchandise, and it was easily procured from the bountiful earth.<sup>3</sup>

#### COHOBIA SNUFF OF THE ANCIENT HAITIANS.

(Plate 3.)

In addition to tobacco the companions of Columbus encountered another narcotic in Haiti, or Hispaniola, called cohoba. It was taken in the form of snuff, inhaled through the nostrils by means of a bifurcated tube. It was correctly described by Ramon Pane, appointed by the great admiral to report upon the superstitious beliefs of the islanders, and also by Las Casas, who was an eyewitness to the ceremonies accompanying its use. Subsequent writers, misled by Oviedo's incorrect statement that this substance was ignited and its smoke inhaled through the nostrils by the bifurcated tube, confused it with tobacco. It was in reality derived from the seeds of a mimosa-like tree, known botanically as *Piptadenia peregrina*. That it could not have been tobacco is apparent from the description of the physiological effects caused by it. All writers united in declaring that it induced a kind of intoxication or hypnotic state, accompanied by visions which were regarded by the natives as supernatural. While under its influence the necromancers, or priests, were supposed to hold communication with unseen powers, and their incoherent mutterings were regarded as prophecies or revelations of hidden things. In treating the sick the physicians made use of it to discover the cause of the malady or the person or spirit by whom the patient was bewitched. The snuff was called cohoba in the language of the islanders. This was rendered in the Italian orthography of the translation of Pane's description, "cogioba," and incorrectly transcribed as "cogiba," or "cojiba." In Spanish orthography it is written "cojoba."

<sup>1</sup> Fiske. *Old Virginia and her Neighbors*, 2: 174. 1898.

<sup>2</sup> It is interesting to note that at a later epoch whisky distilled from maize was used in certain parts of the United States as currency, even for paying the salaries of school teachers and clergymen.

<sup>3</sup> Fiske, *op. cit.* p. 216.



In describing the idols of the islanders Pane gives the following account:

Those of wood are made in this fashion: When someone is going along on a journey he says he sees a tree which is moving its roots; and the man in a great fright stops and asks: "Who is it?" And he replies: "My name is Buhuitihu, and it will indicate who I am." And the man goes to the physician and tells him what he has seen, and the enchanter or wizard runs immediately to see the tree which the man has told him of and sits down by it, and he makes cogioba as we have described [above in the story of the four]. And when the cogioba is made he stands up on his feet and gives it all its titles as if it were some great lord, and he asks it: "Tell me who you are, and what you are doing here, and what you want of me, and why you have had me called. Tell me if you want me to cut you or if you want to come with me, and how you want me to carry you, and I will build you a cabin and add a property to it." Then that tree or cemi, become an idol or devil, replies to him, telling him the shape in which it wants to be made. And he cuts and makes it in the shape it has directed; builds its house for it, and gives the property, and many times in the year makes cogioba for it. This cogioba is to pray to it and to please it and to ask and to learn some things from the cemi, either evil or good, and in addition to ask it for wealth. And when they want to know if they will be victorious over their enemies they go into a cabin into which no one else goes except the principal men, and their chief is the first who begins to make cogioba and to make a noise; and while he is making cogioba no one of them who is in the company says anything till the chief has finished; but when he has finished his prayer he stands a while with his head inclined and his arms on his knees; then he lifts his head up and looks toward the sky and speaks. Then they all answer him with a loud voice, and when they have all spoken, giving thanks, he tells the vision that he has seen, intoxicated with the cogioba which he has inhaled through his nose, which goes up into his head. And he says that he has talked with the cemi and that they are to have a victory; or that his enemies will fly; or that there shall be a great loss of life, or wars, or famine, or some other such things which occur to him who is intoxicated to say. Consider what a state their brains are in, because they say the cabins seem to them to be turned upside down and that men are walking with their feet in the air. And this cogioba they make for cemis of stone and of wood as well as for the dead, as we have described above.<sup>1</sup>

Peter Martyr's account of the inhabitants of Hispaniola, in his *De Orbe Novo*, is simply a paraphrase of Fra Ramon's paper, in Latin. It adds nothing to his description of cohoba, but on the other hand it is misleading, since it refers to it as "an herb which they pound up and drink"; and though it states that the natives "absorb the intoxicating herb called cohobba, which is the same as that used by the bovites to excite their frenzy," it fails to specify that they breathed it through their nostrils by means of a forked tube. Nothing is said of the apparatus by which the snuff is taken, and indeed Ramon Pane himself neglects to give a description of it. Fernando Colombo, however, in his *Historie* (1571) states that for holding the snuff the natives had a finely wrought table of a

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<sup>1</sup> Ramon Pane (1496), in appendix to Fernando Colombo's *Historie*, cap. XIX, p. 137a, 1571.



round form, resembling a trencher (come un tagliere), and that they took it by means of a bifurcated tube, “con una canna di due rami, che si mettono al naso.”

The description of Las Casas is even more precise. The snuff tray he describes as “a plate, not flat but slightly concavish or deep, made of wood, so handsome, smooth, and pretty that it could not be very much more so were it made of gold or silver; it was almost black and polished like jet” (cuasi negro y lucio como de azabache). In describing the tube he says:

The tube was fashioned the size of a flute and was quite hollow, like a flute. From two-thirds of its length onward it divided by means of two hollow canes, just as we open the two middle fingers, leaving out the thumb, with the hand extended. The ends of these two canes inserted into the windows of the nostrils and the base of the flute, let us say, into the powder on the plate, they would draw in their breath and snuffing up, would receive through the nostrils as much of the powder as they wished to take, which, when taken, would go at once to the brain, almost as though they had drunk strong wine; for they would become drunk or almost drunk \* \* \*. It was their custom, in coming together to decide difficult matters, such as the maneuvers of one of their war parties, or the performance of other things which they deemed important, to make their cohoba and with it intoxicate themselves or nearly so to do \* \* \*. I saw these people on several occasions celebrate their cohoba, and it was an interesting spectacle to witness how they took it and what they spake. The chief began the ceremony, and while he was engaged all remained silent. When he had taken his cohoba (that is, when he had snuffed up the powder through his nostrils, as I have described), they being seated on certain handsomely carved low benches which they called duohos (the first syllable long), he remained silent for a while with his head inclined to one side and his arms placed on his knees. Then he raised his face heavenward, uttering certain words which must have been his prayer to the true God, or to him whom he held as God; after which all responded, almost as we do when we say amen; and this they did with a loud voice or sound. Then they gave thanks and said to him certain complimentary things, entreating his benevolence and begging him to reveal to them what he had seen. He described to them his vision, saying that the Cemi had spoken to him and had predicted good times or the contrary, or that children were to be born or to die, or that there was to be some dispute with their neighbors, and other things which might come to his imagination, all disturbed with that intoxication; or if perhaps without it, what the devil, to deceive them and win them to his worship, had brought to them.<sup>1</sup>

The snuff itself was described by Las Casas as “finely ground and of the color of cinnamon or powdered henna” (de color de canela ó de alheña molida).<sup>2</sup>

<sup>1</sup> Las Casas. *Apol. Hist. de las Indias*, Chap. 166, pp. 445–446, ed. Serrano y Saenz, Madrid. 1909.

<sup>2</sup> Alheña is the name of the so-called Egyptian privet, *Lawsonia inermis*, the powdered leaves of which, called henna, were used by the Egyptians for coloring their finger-nails. The fragrant flowers of this plant are the principal source of the perfume wafted by the breezes of “Araby the Blest.”



## THE COHOBÁ TREE STILL PERSISTS IN HAITI.

That a substance with the intoxicating effects of cohobá should have been identified with tobacco seems strange; but if not tobacco, what could have been its origin? Is the custom of taking a narcotic snuff by means of bifurcated tube still in existence in any part of America? If so, from what plant is the snuff prepared, and is this plant to be found growing on the island of Haiti? These questions may be answered as follows: The custom of taking a narcotic snuff still prevails in various localities of South America, showing that at one time it must have been widely spread. In inhaling it some tribes used bifurcated tubes which correspond very closely with the descriptions of those used in Hispaniola (fig. 4). The plant from which the snuff is derived is *Piptadenia peregrina*, a tree which grows both spontaneously and in cultivation on the banks of the Orinoco and Amazon Rivers and their tributaries. This tree does grow on the island of Hispaniola, or Haiti, as well as upon the neigh-



FIG. 4.—Forked tube for inhaling narcotic *Piptadenia* snuff through the nose.

boring island of Porto Rico and several other of the Antilles, and—most interesting and convincing of all facts connected with it—it still bears the

name cohobá, which was applied in ancient times both to the snuff itself and to the ceremonial practice of using it.

In connection with his studies of the plants used by the aborigines of America, the writer encountered various narratives of travelers in South America in which ceremonial snuff taking by savage tribes by means of bifurcated tubes was described. In all cases the snuff was made from the seeds of *Piptadenia peregrina*, the tree called Cohobá in Haiti. Among the writers who bear testimony to this practice are Padre Gumilla, in his *Orinoco Ilustrado* (1741); M. de la Condamine in his interesting *Relation*, published in the *Memoires de l'Academie Royale des Sciences*, Année 1745; Humboldt and Bonpland in their *Voyage aux Régions Equinoxiales* (1819), and Spix and Martius, *Reise in Brasilien* (1831). One of the most interesting features in connection with the use of the seeds of *Piptadenia* is described by Spix and Martius—the use of an infusion made from them as an enema. This was accomplished by means of pear-shaped rubber syringes, which, according to M. de la Condamine, were passed around to guests at ceremonial feasts. In various parts of South America the snuff was called niopa, ñupa, curupa, curuba, and paricá; and a similar or identical snuff, also made from *Piptadenia* seeds, was called cebil or sebil in Argentina and vilca, huilca, or willca in Peru.



For a full account of this interesting narcotic the reader is referred to the author's recent paper, "Identity of Cohoba, the narcotic snuff of ancient Haiti," published in the *Journal of the Washington Academy of Sciences*, volume 6, pages 547 to 562. It is remarkable that the identity of cohoba, mentioned in the very first account of the ethnology of the aboriginal inhabitants of the New World, should have remained unknown for three centuries, and more remarkable still that the seeds of *Piptadenia peregrina*, known to possess violent narcotic properties, should never have been studied by chemists. Humboldt was so much surprised on finding that the source of the snuff was a leguminous seed that he suggested the possibility of its intoxicating effects being due to the admixture of lime with it, but Richard Spruce, who saw the snuff prepared without lime, showed that this supposition was erroneous. It is not so strange, as Humboldt would indicate, that seeds of Leguminosæ should possess narcotic properties. The scarlet seeds of *Sophora secundiflora*, or *Broussonetia secundiflora*, of Texas and northern Mexico, are also very narcotic and are still used by certain Indian tribes for ceremonial purposes, as described below.

#### THE RED BEAN OF NORTHERN MEXICO AND TEXAS.

(Plate 3.)

*Broussonetia secundiflora*, described and figured by Ortega in 1798 from a plant growing in the Royal Garden at Madrid, but more commonly known by the name *Sophora secundiflora*, is a beautiful evergreen shrub or small tree with pinnately compound glossy leaves, racemes of violet-colored flowers, and indehiscent pods containing scarlet bean-like seeds. The latter have been studied chemically and are known to contain a narcotic poisonous alkaloid allied to cytisin, having a physiological effect very much like that of tobacco. From Texas, reports have been received that the seeds have poisoned children. The plant, though usually avoided by animals, is eaten by deer and goats, and the hard, glossy beans when swallowed whole are apparently harmless. In early days they were much used by certain tribes of Indians for making a narcotic decoction, and when ground to a powder were put in mescal, or Agave brandy, to make it more intoxicating; hence the name "mescal bean," which was formerly applied to them.

In early days these beans were so highly valued by the Indians of the Mexican border region that a string of them 6 feet long would be accepted in barter for a pony. According to Dr. Rothrock, who quotes Mr. Bellanger, of Texas, "the Indians near San Antonio used this bean as an intoxicant, half a bean producing delirious exhilaration followed by a sleep that lasts two or three days; and it is asserted that a whole bean would kill a man."<sup>1</sup>

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<sup>1</sup> See Havard, V., *Proc. U. S. Nat. Mus.* 8: 500. 1885.



Mr. Alanson Skinner, in describing the Red Bean Dance of the Iowa Indians, says that among them this ancient rite far antedates the practice of eating peyote (*Lophophora Williamsii*) which they have more recently adopted. According to their traditions the society of red-bean dancers was founded by an Indian who while fasting dreamed that he received the secret from the deer: "for red beans (mescal) are sometimes found in deer's stomachs." The beans were prepared by first placing them before the fire until they turned yellow. Then they were taken and pounded up fine and made into a medicine brew. The members then danced all night. A little after midnight they began to drink the narcotic decoction, and continued to drink it until daybreak, when its effects became apparent in causing them to vomit. After vomiting and praying repeatedly they believed themselves ceremonially cleansed, the evil being having been expelled from their bodies. Members of the society, when they went to war, tied some of these red beans around their belts, deeming them efficacious as a charm to protect them from injury. The *mancácutzi warúhave*, or "red-bean war-bundle," was regarded by the society as a sacred charm, the possession of which brought success in war, hunting, especially for the buffalo, and in horse racing.<sup>1</sup>

These beans are often confused with those of certain species of *Erythrina*, which are sometimes sold in their place in the markets of Mexico, but which are not at all narcotic. Sometimes both kinds are found mixed together in the same package. Both are known alike under the names *colorin*, *frijolillo*, and *coral bean*, on account of their similarity; but in southern Texas the seed of *Broussonetia* is known as *Indian Bean*, or *mescal bean*. The plants of *Broussonetia* and *Erythrina* do not in the least resemble each other, and there is no possibility of confusing either the flowers or the legumes of the two genera; so that when adulteration of the narcotic beans occurs it is undoubtedly intentional.

#### MEXICAN PLANT WORSHIP.

From the accounts of early writers it appears that the ancient Mexicans attributed to all plants a spirit not unlike that of animals or even of man himself. To certain plants special honors were paid; others were avoided with dread; while others, with no pronounced virtues or evil properties, were little noticed. An example is given by a Mexican writer of the homage paid to a certain tree cut down in order to form a bridge over a stream in Michoacan. The people of the village were called together by the governor and a religious service was held about a cross erected for the special ceremony, with candles burning before it and choristers assisting. A pro-

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<sup>1</sup> Skinner, Alanson. *Anthrop. Papers, Amer. Mus. Nat. Hist.* 11: 718. 1915.



cession was formed which climbed the mountain where the tree was growing. When it fell there came an aged Indian woman who, taking a few of its branches, laid them on the trunk where it had been cut, and, consoling it with loving words, begged that it might not feel humiliated or angry; for they had chosen it on account of its magnificent stature and great strength, and it was destined to span a mighty river, so that all the people of the land of Michoacan might cross over upon it. And before dragging it away they placed upon the place where it had fallen a piece of lighted candle which had been left over from Holy Thursday, and they repeated in its honor a very solemn litany, sprinkling it with holy water and much pulque.<sup>1</sup> On the next day, having propitiated the spirit of the tree, they bore away the hewn beam to the bridge with much shouting and jubilation.<sup>2</sup>

The same author speaks of the veneration paid by the Mexicans to certain medicinal plants and to the narcotic ololiuhqui, the sacred nanacatl, the peyotl, and the picietl (tobacco), "to which they ascribe deity and with which they practice superstitions."

#### LOPHOPHORA WILLIAMSII, THE SO-CALLED SACRED MUSHROOM.

Bancroft, in referring to the narcotics used by the ancient Mexicans, mentions one which was believed by the early Spaniards to be a fungus. In writing of their ceremonial feasts, he says:

Among the ingredients used to make their drinks more intoxicating the most powerful was the teonanacatl, "flesh of God," a kind of mushroom which excited the passions and caused the partaker to see snakes and divers other visions."<sup>3</sup>

This information was undoubtedly derived from accounts of the Spanish padres, one of whom, Bernardino Sahagun, writing before the year 1569, states that it was the Chichimeca Indians of the north who first discovered the properties and made use of these "evil mushroom which intoxicate like wine."<sup>4</sup>

They were gathered in the territory now northern Mexico and southern Texas, preserved by drying, and carried southward. The inhabitants of the Valley of Mexico knew them only in their dry state. It is also very probable that the early writers who recorded their use had seen them only when dry and never knew them as living plants. Francisco Hernandez, the physician sent by Philip II in 1570 to study the resources of Mexico, or New Spain, describes

<sup>1</sup> Fermented sap of the century plant (*Agave americana*), which also yields the strong distilled spirit called mescal.

<sup>2</sup> Jacinto de la Serna, "Manual de Ministros par el conocimiento de idolatrias y extirpacion de ellas." In Documentos inéditos para la Historia de España, vol. 104, pp. 159-160.

<sup>3</sup> Bancroft, H. H., Native Races, 2: 360. 1875.

<sup>4</sup> Sahagun, Bernardino (1499-1590). Hist. Nueva España (ed. Bustamante), 3: 118.



them under the heading "De nanacatl seu Fungorum genere." From the harmless white mushrooms (iztacnanacame), red mushrooms (tlapalnanacame), and yellow orbicular mushrooms (chimalnanacame), used for food, he distinguished them as teyhuinti, which signifies "intoxicating."<sup>1</sup>

In this connection it is interesting to note that this Nahuatl word, teyhuinti, or teyuinti (from yuinti, to be drunk), survives in the form of tejuino or tehuino in the State of Jalisco, Mexico, and tesuino or tizwin in the southwestern United States as the name of certain intoxicating drinks, the principal of which is a kind of beer brewed from malted maize.

#### DETERMINATION OF THE DRUG.

Three centuries of investigation have failed to reveal an endemic fungus used as an intoxicant in Mexico, nor is such a fungus mentioned either in works on mycology or pharmacography, yet the belief prevails even now that there is a narcotic Mexican fungus, and it is supported by Siméon in his monumental dictionary of the Nahuatl language, in which the following definitions occur:

Teonanacatl, espèce de petit champignon qui a mauvais gout, enivre et cause des hallucinations; il est médicinal contre les fièvres et la goutte.<sup>2</sup>

Teyuinti, qui enivre quelqu'un, enivrant; teyuinti nanacatl, champignon enivrant.<sup>3</sup>

In connection with his study of the economic plants of the Mexicans and the Indians of the southwestern United States the writer has sought diligently for a fungus having the properties attributed to the teonanacatl. As this narcotic was used by various tribes of Chichimecas, and the Chichimecas inhabited the territory situated in what is now northern Mexico and the southwestern United States, it was natural to look for the plant in this region. No such fungus, however, was discovered, but in its place a narcotic plant having properties exactly like those attributed to the teonanacatl was encountered; moreover, one form of this plant, when prepared as a drug, resembles a dried mushroom so remarkably that at first glance it will even deceive a mycologist (pl. 5). It is discoid in form and apparently peltate when seen from below; but the upper surface bears tufts of silky hairs, and a close inspection reveals the fact that it is the crown of a small fleshy spineless cactus which has been cut off and dried. The cactus in question, *Lophophora Williamsii*, when

<sup>1</sup> "Quoniam inebrare solent, Teyhuinti nomine nuncupati sunt, et e fulvo in fuscum vergant colorem, risum inopportunist concitent, imaginemque citra risum inebriantium possint exhibere." Hernandez, Francisco (1514-1578). Hist. Pl. Nov. Hisp. (ed. Rom.) 2: 357. 1790.

<sup>2</sup> Siméon, Rémi, Dict. de la langue Nahuatl, p. 436, 1885.

<sup>3</sup> Op. cit., p. 412.



entire, resembles a carrot or radish rather than a mushroom, and when cut into longitudinal slices or irregular pieces, would never be mistaken for a fungus. Its chemical properties were investigated first by Dr. Lewin of Berlin, in 1888; afterward by Dr. Heffter of Leipzig. It was also studied by Drs. D. W. Prentiss and Francis P. Morgan of Washington. Alkaloids derived from it have been named lophophorine, anhalonine, and mezcaline.

#### IDENTITY WITH NARCOTIC PEYOTL.

Sahagun, who described the drugs of the ancient Mexicans from specimens brought to him by Indian herb doctors, failed to recognize the identity of the *teonanacatl* and *peyotl* of the Chichimecas, although he attributes similar narcotic properties to each. The latter he describes as follows:

There is another herb, like tunas<sup>1</sup> of the earth; it is called *peiotl*; it is white; it is produced in the north country; those who eat or drink it see visions either frightful or laughable; this intoxication lasts two or three days and then ceases; it is a common food of the Chichimecas, for it sustains them and gives them courage to fight and not feel fear nor hunger nor thirst; and they say that it protects them from all danger.<sup>2</sup>

The plant itself was described by Hernandez as follows, under the heading *De Peyotl Zacatecensi, seu radice molli et lanuginosa*:

The root is of nearly medium size, sending forth no branches nor leaves above ground, but with a certain woolliness adhering to it on account of which it could not be aptly figured by me. Both men and women are said to be harmed by it. It appears to be of a sweetish taste and moderately hot. Ground up and applied to painful joints it is said to give relief. Wonderful properties are attributed to this root (if any faith can be given to what is commonly said among them on this point). It causes those devouring it to be able to foresee and to predict things; such, for instance, as whether on the following day the enemy will make an attack upon them; or whether the weather will continue favorable; or to discern who has stolen from them some utensils or anything else; and other things of like nature which the Chichimecas really believe they have found out. On which account this root scarcely issues forth but conceals itself in the ground, as if it did not wish to harm those who discover it and eat it.<sup>3</sup>

From the above description, which applies perfectly to the plant from Zacatecas shown in plate 6, it follows that the *peyotl zacatecensis* of Hernandez is identical with *Lophophora Williamsii*. Specimens of the drug collected in northern Zacatecas by Dr. Francis E. Lloyd are shown in plate 7. They bear little resemblance to the mushroom-like buttons shown in plate 5, and it is not surprising that they should have been supposed to be distinct from the *teonanacatl* by the early Spanish writers.

<sup>1</sup> Tuna, the Spanish name for the fruit of the *Opuntia*, or prickly pear.

<sup>2</sup> Sahagun (1490–1590). *Hist. general de las cosas de Nueva España* (ed. Bustamante) 3: 241. 1830.

<sup>3</sup> Hernandez (1415–1578). *De Hist. plant. Nov. Hisp.* 3: 70. 1790.



## RAIZ DIABOLICA, OR DEVIL'S ROOT.

(Plates 6 and 7.)

By this term it was designated by Padre José Ortega, who tells of its use by the Cora Indians in his *Historia del Nayarit*, published anonymously at Barcelona in 1754, and republished under his own name in 1887. In describing their nocturnal dances he writes as follows:

Close to the musician was seated the leader of the singing whose business it was to mark the time. Each of these had his assistants to take his place when he should become fatigued. Nearby was placed a tray filled with *peyote* which is a diabolical root (*raiz diabolica*) that is ground up and drunk by them so that they may not become weakened by the exhausting effects of so long a function, which they began by forming as large a circle of men and women as could occupy the space of ground that had been swept off for this purpose. One after the other went dancing in a ring or marking time with their feet, keeping in the middle the musician and the choirmaster whom they invited, and singing in the same unmusical tune (*el mismo descompasado tono*) that he set them. They would dance all night, from 5 o'clock in the evening to 7 o'clock in the morning, without stopping nor leaving the circle. When the dance was ended all stood who could hold themselves on their feet; for the majority from the peyote and the wine which they drank were unable to utilize their legs to hold themselves upright.<sup>1</sup>

The early missionaries were opposed to the drug not so much on account of its physiological effects upon the Indians but because of its connection with certain superstitious rites connected with their primitive religion. Eating the *teonanacatl*, or *peyotl*, was declared by the padres to be almost as grave a sin as eating human flesh. In a little religious manual published by Fray Bartholomé Garc a in 1760, for the use of the missionaries to the Indians of San Antonio, Tex., the following questions, to be used in the confessional, are printed:

"Has comido carne de gente?" (Hast thou eaten flesh of man?)

"Has comido el peyote?" (Hast eaten the peyote?)<sup>2</sup>

The name *teonanacatl* is now obsolete. The drug is called by various names among the Indians using it—*xicori* by the Huicholes of Jalisco; *hikori*, or *hikuli*, by the Tarahumaris of Chihuahua; *huatari* by the Cora Indians of the Tepic Mountains; *kamaba* by the Tepehuanes of Durango; *ho* by the Mescalero Apaches, of New Mexico, who formerly ranged as far south as Coahuila; *seni* by the Kiowas; and *wokowi* by the Comanches, some of whom formerly lived in the State of Chihuahua. The name *peyote* has survived as a general commercial term; and the mushroomlike disks from the Rio Grande region are now widely spread among the northern In-

<sup>1</sup> Ortega, Padre José (d. 1700). *Hist. del Nayarit*, pp. 22-23 (new ed.). 1887.

<sup>2</sup> Garcia, Fr. Bartholomé. *Manual para administrar los Santos Sacramentos*, etc., p. 15. 1760.



dians of the United States under the misleading names of “mescal buttons” or “mescal beans,” as well as under the Nahuatl name *peyote*.

#### CEREMONIAL USE BY THE INDIANS.

In a paper by the present writer published in the *Journal of Heredity* (vol. 6, No. 7, 1915) under the title, “An Aztec Narcotic,” the author gives an account of the ceremonial use of this plant by various tribes of Indians. The first to bring to public notice its ceremonial use by existing tribes of Indians was James Mooney, of the Bureau of American Ethnology (1891). His attention had been directed to it while making investigation among the Kiowas, who are descendants of one of the tribes called Chichimecas by the Aztecs; and it is from the Chichimecas that they declared they had received the knowledge of this plant. Like the Aztecs, the Kiowas ascribed divine attributes to the drug, and their ceremony in connection with it was essentially religious. Not only the Kiowas, but other tribes now living in Oklahoma receive supplies of the narcotic from traders who bring it from the vicinity of Laredo, Tex., in olden times the land of the Chichimecas. Mr. Mooney’s account was published in the *Therapeutic Gazette* of September 16, 1895. Other observers who mention the use of the narcotic *Lophophora* are Lumholtz, who describes the ceremonies of the Tarahumari Indians connected with it, and Leon Diguët, who tells of its use by the Huichol Indians of the mountains of Jalisco and Tepic.

Efforts have been made to prevent its spread among the Indians of the United States. An account of the recent prosecution of an Indian named Nah-qua-tah-tuck, of the Menominee Indian Reservation, Wis., for furnishing this drug to Indians of his tribe is given in the author’s paper above cited. It developed in the trial that there is a regularly organized association among the Indians, called the Peyote Society, holding weekly services in which it is administered as a sort of communion; and it was claimed that its use put an end to the habit of drinking alcoholic beverages. Dr. Morgan, of the Bureau of Chemistry, gave to the court an account of his experiments bearing upon the physiological action of the narcotic.

At a meeting of the Lake Mohonk Conference in October, 1914, several papers relating to the effects of this drug upon the Indians were read and affidavits from two Omaha Indians were quoted. From one of the latter I take the following extracts:

#### AMONG THE OMAHA INDIANS.

At the meetings of the society “before they sing they pass the peyote around. They begin taking this medicine along about dark, and when they pass it, ask you how many you want, and they often try to persuade you to take more



than you want. The medicine does not work right away, but after it begins to take effect along toward midnight they begin to cry and sing and pray and stand and shake all over, and some of them just sit and stare. I used to sit in their range right along, and ate some of their medicine, but after I ate it the first time I was kind of afraid of it. It made me feel kind of dizzy and my heart was kind of thumping and I felt like crying. Some of them told me that this was because of my sins. It makes me nervous, and when I shut my eyes I kind of see something like an image or visions, and when my eyes are open I can't see it so plain. One of these fellows took 12 beans, or 12 peyote, sitting with some girls.

"After I have take 12 peyote I saw a mountain with roads leading to the top and people dressed in white going up these roads. I got very dizzy, and I began to see all kinds of colors, and arrows began to fly all around me. I began to perspire very freely. I asked to be taken out of doors. At that time it was 20° below zero. I felt better when I got out of doors. When I went in again I began to hear voices, just like they came from all over the ceiling, and I looked around in the other room and thought I heard women singing in there; but the women were not allowed to sing in the meetings usually, and so this was kind of strange. After eating 36 of these peyote I got just like drunk, only more so, and I felt kind of good, but more good than when I drink whisky; and then after that I began to see a big bunch of snakes crawling all around in front of me, and it was a feeling like as if I was cold came over me. The treasurer of the Sacred Peyote Society was sitting near me, and I asked him if he heard young kittens. It sounded as if they were right close to me; and then I sat still for a long time and I saw a big black cat coming toward me, and I felt him just like a tiger walking up on my legs toward me; and when I felt his claws I jumped back and kind of made a sound as if I was afraid, and he asked me to tell him what was the matter, so I told him after a while. I did not care to tell at first; but I made up my mind then, after what I saw, that I would not take another one of these peyotes if they gave me a \$10 bill. In this Sacred Peyote Society they have a form of baptism and they baptize with the tea made from stewing the peyote, and they baptize 'in the name of the Father, and the Son, and the Holy Ghost,' the Holy Ghost being the peyote. Then you drink some of the tea, and they make signs on your forehead with the tea, and then take an eagle's wing and fan you with it. I heard an educated Indian, and he said in a meeting on Sunday morning, 'My friends, I am glad I can be here and worship this medicine with you; and we must organize a new church and have it run like the Mormon Church.'"<sup>1</sup>

#### USE IN ANCIENT MEXICO.

From the preceding description of a meeting of the Sacred Peyote Society held by the Winnebagos and Omahas in 1914, I turn back to the first account we have of the Teonanacatl feasts of the Aztecs, written by Padre Bernardino Sahagun in the sixteenth century—before Sir Francis Drake set out upon his voyage round the world—before tobacco, which the Mexicans also worshipped, was first brought to England:

The first thing eaten at the party was certain black mushrooms, which they call nanacatl, which intoxicate and cause visions to be seen, and even provoke

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<sup>1</sup> Daiker, F. H., "Liquor and Peyote a Menace to the Indian," in Report of the Thirty-second Annual Lake Mohonk Conference, October, 1914, pp. 66, 67.



sensuousness. These they ate before the break of day, and they also drank cacao (chocolate) before dawn. The mushrooms they ate with sirup (of maguey sap), and when they began to feel the effect they began to dance; some sang; others wept because they were already intoxicated by the mushrooms; and some did not wish to sing, but seated themselves in their rooms and remained there as though meditating. Some had visions that they were dying and shed tears; others imagined that some wild beast was devouring them; others that they were capturing prisoners in warfare; others that they were rich; others that they had many slaves; others that they had committed adultery and were to have their heads broken as a penalty; others that they had been guilty of a theft, for which they were to be executed; and many other visions were seen by them. After the intoxication of the mushrooms had passed off they conversed with one another about the visions which they had seen.<sup>1</sup>

#### NARCOTIC DATURAS.

In early accounts of the aborigines of America, both north and south of the Equator, we find repeated references to the use of various daturas as narcotics. The Quichuas of Peru put the seeds of a datura into their azua, or fermented corn beer, to make it more intoxicating. They believed that the visions thus produced were supernatural and, like the remote Zuñis of New Mexico, they resorted to datura seeds in order to divine the hiding place of some precious object or to detect the thief who had stolen it. The professional Indian hechiceros of Spanish America were prosecuted by the church authorities for using narcotics in their practices of idolatry and witchcraft, very much as were the dhatura doctors of India for dispensing datura to criminals; and in the New World, as in the Old World, datura seeds were administered in various ways as a love potion or aphrodisiac. Another remarkable parallel may be seen in the religious use of the drug. Among the Aztecs the seeds of a certain datura were held sacred and the spirit of the plant was invoked to expel evil spirits, recalling the exhortations of the priests, or physicians, of ancient Babylon and the necromancers of mediæval Europe. In the Andes of South America Indian priests used datura seeds to produce delirium, recalling the use of intoxicants to induce frenzy by the Pythiæ in consulting the famous oracle of Apollo at Delphi.

M. de la Condamine, while exploring the Rio Marañon in 1743, found the Omagua Indians inhabiting the banks of that river addicted to narcotics, one of which was referred by him to *Datura arborea*, the plant "called by the Spaniards floripondio, with flowers shaped like a drooping bell, which has been described by Père Feuillée."<sup>2</sup> Miss Alice Eastwood, while exploring southeastern Utah, came upon an abundance of *D. meteloides*, and she

<sup>1</sup> Sahagun, Bernardino. Hist. Nueva España (ed. Bustamante) 2: 366. 1829.

<sup>2</sup> See Mem. de l'Acad. Roy. des Sciences, Année 1745, p. 430. 1749.



calls attention to the occurrence of its seed-pods "in the ruins of the ancient people who once filled this land and guarded every spring with towers of stone."<sup>1</sup> Stephen Powers found this same plant in use as an intoxicant and hypnotic by the priests and wizards of the



FIG. 6.—Stone mortar, used by the California Indians for grinding root of *Datura meteloides* for ceremonial purposes.

Yokuts Indians inhabiting the banks of the Tule River and Lake Tulare in California.<sup>2</sup> Dr. Edward Palmer states that a decoction of the plant is given by certain California Indians to their young women to stimulate them in dancing, and that an extract of its root is used as an intoxicant by the Pah-Utes.<sup>3</sup> Other authorities state that the Mariposan Indians of California, including the Noches, or Yokuts, already mentioned, use a decoction of *Datura meteloides* in the ceremonial initiation of their youths into the status of man-

hood; and the medicine men of the Hualpais, or Walapais, belonging to the Yuman stock, indulge in a sacred intoxication by breaking up the leaves, twigs, and root of this plant to make a beverage which induces an exhilaration accompanied by prophetic utterances.<sup>4</sup>

#### THE SACRED OLOLIUHQUI OF THE AZTECS.

(Plate 8.)

This narcotic, beyond all doubt the seeds of a datura, or possibly two species of datura, played an important part in the religion of the ancient Mexicans and in the practices of their medicine men or necromancers.

Sahagun, about 1569, called attention to this plant in the following words:

There is an herb which is called coatlxoxouhqui [green snake weed]. It produces a seed called ololiuhqui which intoxicates and causes madness (enloquece). It is administered in potions in order to cause harm to those who are objects of hatred. Those who eat it have visions of fearful things. Magicians or those who wish to harm some one administer it in food or drink. This herb is medicinal, and its seed is used as a remedy for gout, ground up and applied to the part affected.<sup>5</sup>

In other accounts it is stated that in Mexico it was believed that this plant, like the peyotl would give to those who ate it the power of second sight and prophecy, by means of which they could discover the identity of a thief, if an object had been stolen, or could predict the outcome of a war or the intended attack of a hostile tribe.

In the descriptions of ololiuhqui there are many discrepancies, owing possibly to the fact that the same name was applied to two or

<sup>1</sup> Zoe, 3 : 360. 1892.

<sup>2</sup> See Contr. North Amer. Ethn. 3 : 380 and 428. 1877.

<sup>3</sup> Amer. Nat. 12 : 650. 1878.

<sup>4</sup> See Bourke, John G. On the Border with Crook, p. 165. 1892.

<sup>5</sup> Sahagun, Bernardino de. Hist. Gen. de las Cosas de Nueva España, 3 : 241 (ed. Bustamante), Mexico. 1830.



more plants with flowers resembling morning-glories. Hernandez (1514–1578) in all probability never saw it growing, and figured it as an *Ipomoea*, but he indicates its relationship by suggesting that it may be the same as the *Solanum maniacum* of Dioscorides, and Padre Serna, who likewise never noticed the plant itself, described the seeds as resembling lentils (*semilla a modo de lentejas que llaman ololiuhqui*). It is interesting to note that Acosta makes the same comparisons in his description of the East Indian *Datura metel*, saying that it has flowers like the plant called in Spain *correguela mayor* (greater convolvulus) and that its fruit is filled with seed of the size of lentils (*todo lleno de una simiente del tamaño de lentejas*). Great veneration was paid by the Mexicans to the ololiuhqui as well as to tobacco (*picietl*) and to the narcotic *teonanacatl*, or *peyotl* (*Lophophora Williamsii*).<sup>1</sup> To these plants according to Padre Serna, the Mexicans ascribed divine powers, with which they practiced magic.

The methods of the Aztec *titzitl*, or herb-doctors, in casting out the evil spirits causing sickness, are remarkably like those employed by the priests of ancient Babylon and of the island of Haiti. The spirit of the powerful Ololiuhqui was invoked in the following words:

Come now, come hither, Green Woman; behold the green heat [fever] and the brown heat; remove thou the flaming or scarlet heat, the yellow heat, or by this token I send thee to the seven caves. And, I do command thee, put it not off till tomorrow or another day; for sooner or later thou wilt be compelled to do it. Who is the god—the so powerful and superior one—who can destroy the work of thy hands? It is I who command it, I the prince of enchantment.<sup>2</sup>

#### THE USE OF DATURA METELOIDES BY THE ZUÑIS.

(Plate 9.)

It seems strange that the property of giving the power of second sight and prophecy, attributed to the ololiuhqui by the Mexicans, should be similarly attributed by the ancient Peruvians to *Datura sanguinea* and by the 'Zuñis of New Mexico, so far remote from them, to *D. meteloides*, with which the ololiuhqui is undoubtedly identical. Mrs. Matilda Coxe Stevenson in her *Ethnobotany of the Zuñi Indians* relates a pretty legend connected with "this precious plant, which is believed to have once been a boy and a girl," resembling a story from Ovid's *Metamorphoses*. Plate 9 is the photograph of flowers and fruit of a specimen of *Datura meteloides*, two-thirds natural size, made at Sacaton, Arizona, by Mr. Harold Murphy. It was secured by the writer through the courtesy of Mr. Thomas H. Kearney, of

<sup>1</sup> For an account of the ceremonial use of the last-named plant see the writer's paper on "An Aztec Narcotic" in *Journal of Heredity*, 6: 291–311. 1915.

<sup>2</sup> See Jacinto de la Serna, "Manual de Ministros para el conocimiento de idolatrías y extirpacion de ellas." In *Documentos inéditos para la Historia de España*, vol. 104, pp. 159–160.



the Bureau of Plant Industry. The plant is identical in all respects with similar plants previously collected in various parts of Mexico and the southwestern United States by the late Dr. Edward Palmer, who called attention to the use of the plant at the present day by several tribes of Indians as a ceremonial and narcotic.

ORIGIN OF THE NAME JIMSON, OR JAMESTOWN WEED.

(Plate 10.)

The narcotic properties of *Datura stramonium* were known to our own southern Indians as well as to the Mexicans.<sup>1</sup> Hernandez calls attention to the fact that its fruit causes insanity if eaten incautiously. That this is true is shown by the following anecdote taken from Robert Beverly's History and Present State of Virginia, in his account "Of the Wild Fruits of the Country." It appears that the soldiers sent to Jamestown to quell the uprising known as Bacon's Rebellion (1676) gathered young plants of this species and cooked it as a potherb.

The *James-Town* Weed (which resembles the Thorny Apple of Peru, and I take to be the Plant so call'd) is supposed to be one of the greatest Coolers in the World. This being an early Plant, was gather'd very young for a boil'd salad, by some of the Soldiers sent thither, to pacifie the Troubles of *Bacon*; and some of them eat plentifully of it, the Effect of which was a very pleasant Comedy; for they turn'd natural Fools upon it for several Days: One would blow up a Feather in the Air; another woul'd dart Straws at it with much Fury; and another stark naked was sitting up in a Corner, like a Monkey, grinning and making Mows at them; a Fourth would fondly kiss, and paw his Companions, and sneer in their Faces, with a Countenance more antick, than any in a *Dutch* Droll. In this frantick Condition they were confined, lest they should in their Folly destroy themselves; though it was observed, that all their Actions were full of Innocence and good Nature. Indeed, they were not very cleanly; for they would have wallow'd in their own Excrements, if they had not been prevented. A Thousand such simple Tricks they play'd, and after Eleven Days, return'd themselves again, not remembering any thing that had pass'd.<sup>2</sup>

THE HUACA-CACHU OF PERU.

(Plate 11.)

The narcotic effects of *Datura sanguinea*, known in Peru as Huacacachu, or Yerba de Huaca, have been described by several travelers. Tschudi, who found it growing on the declivities of the Andes above the village of Matucanas, repeats the statement of Humboldt that from its fruit the Indians prepare a very powerful intoxicant which they call tonga, on which account the Spaniards named the plant borrachero. His account is as follows:

The Indians believe that by drinking the tonga they are brought into communication with the spirits of their forefathers. I once had an opportunity

<sup>1</sup> Its active principle, daturine, has been identified with the alkaloid atropine, for which it is a perfect substitute. In 1916 one firm in the United States used one and a half million of pounds of this plant for the manufacture of atropine.

<sup>2</sup> [Beverly, Robert.] History and Present State of Virginia. Bk. 2, p. 24. 1705.



of observing an Indian under the influence of this drink. Shortly after having swallowed the beverage he fell into a heavy stupor; he sat with his eyes vacantly fixed on the ground, his mouth convulsively closed, and his nostrils dilated. In the course of about a quarter of an hour his eyes began to roll, foam issued from his half-opened lips, and his whole body was agitated by frightful convulsions. These violent symptoms having subsided, a profound sleep of several hours succeeded. In the evening I again saw this Indian. He was relating to a circle of attentive listeners the particulars of his vision, during which he alleged he had held communication with the spirits of his forefathers. He appeared very weak and exhausted.

In former times the Indian sorcerers, when they pretended to transport themselves into the presence of their deities, drank the juice of the thorn-apple in order to work themselves into a state of ecstasy. Though the establishment of Christianity has weaned the Indians from their idolatry, yet it has not banished their old superstitions. They still believe that they can hold communications with the spirits of their ancestors, and that they can obtain from them a clue to the treasures concealed in the huacas, or graves; hence the Indian name of the thorn-apple—huacacachu, or grave plant.

Humboldt and Bonpland, who collected *Datura sanguinea* on the banks of the Rio Mayo, in New Granada, state that the natives believe that the tonga prepared from this species to be more efficacious as a narcotic than that made from the white-flowered *Datura arborea* mentioned above. It is from the account of these travelers that the story of the Peruvian prophets is taken. The Temple of the Sun in which they officiated was at Sagamoza, in the interior of what is now Colombia. Dr. Santiago Cortés, in his account of the medicinal plants of the province of Cauca, Colombia, says that there are many stories and fables relating to this plant told by the natives.

#### COCA, THE SOURCE OF COCAINE.

(Plates 12 and 13.)

The most important stimulant of the ancient Peruvians was *Erythroxylon Coca*. Specimens of its 3-ribbed leaves were found by the writer in many prehistoric graves along the Peruvian coast, usually in bags suspended from the necks of mummies, or in bundles wrapped in cloth. Some of the coca bags, or pouches, were woven in beautiful and intricate designs (pl. 12), often representing conventional figures of birds, mammals, or fishes. All were accompanied by small gourds (a variety of *Cucurbita lagenaria*) containing lime, and a spatula by means of which the lime was dipped out. In place of lime, wood-ashes were sometimes used. The use of lime or ashes to set free the alkaloid contained in the leaves recalls the same custom in connection with the betel of Asia, the piptadenia snuff already mentioned, and the "green tobacco" of the Mexicans. That its efficacy should have been independently discovered by the primitive inhabitants of such widely separated regions is remarkable. The lime gourds were not infrequently ornamented, and in those discovered in some localities, especially at Arica, on the coast of northern Chile, the spatulæ were



of carved bone, many of them of beautiful designs, and the gourds were suspended by carved bone toggles resembling Japanese netsukes. Specimens of the latter may be seen in the Field Museum at Chicago. Two packages of leaves from Peruvian graves sent to the Smithsonian Institution by the late Henry Meigs, the builder of the great trans-Andine railway from Callao to Oroya, were found by the writer, one bearing the label "tobacco," the other "Paraguay tea." The contents of both of these packages proved to be coca leaves, easily identified by the pseudo-rib, extending on each side of the midrib from the base to the apex.

In the accompanying illustrations plate 13 is a photograph by Mr. Grover Bruce Gilbert of a specimen collected by Mr. O. F. Cook at Santa Ana, Peru, during his recent mission to South America.<sup>1</sup>

The leaves of *Erythroxylon Coca*, which from remote ages have been used by South American Indians as a stimulant, are the source of cocaine, now so widely used in surgery to deaden pain and also as a narcotic. Like other narcotic alkaloids, although it is a great blessing to the human race when wisely used, yet when abused it is a terrible curse. In Peru the use of coca by miners and cargueros is still common. There the entire leaf is used. In North Brazil, where it is also extensively used under the name ipadú, the leaves are ground to a fine powder. Spruce, who saw the process of preparing the leaves near the mouth of the Rio Negro in 1851, gives the following account of it in Hooker's Journal of Botany for July, 1853:

The leaves of ipadú are pulled off the branches one by one and roasted on the mandioca-oven, then pounded in a cylindrical mortar, 5 or 6 feet in height, made of the lower part of the trunk of the Pupunha or Peach Palm (*Guilielma speciosa*), the hard root forming the base and the soft inside being scooped out. It is made of this excessive length because of the impalpable nature of the powder, which would otherwise fly up and choke the operator; and it is buried a sufficient depth in the ground to allow of its being easily worked. The pestle is of proportionate length and is made of any hard wood. When the leaves are sufficiently pounded the powder is taken out with a small cuya fastened to the end of an arrow. A small quantity of tapioca, in powder, is mixed with it to give it consistency, and it is usual to add pounded ashes of Imba-úba or Drum tree (*Cecropia peltata*), which are saline and antiseptic. With a chew of ipadú in his cheek, renewed at intervals of a few hours, an Indian will go for days without food and sleep.

In April, 1852, I assisted, much against my will, at an Indian feast in a little rocky island at the foot of the falls of the Rio Negro; for I had gone down the falls to have three or four days' herborising, and I found my host—the pilot of the cataracts—engaged in the festivities, which neither he nor my man would leave until the last drop of cauim (coarse cane or plantain spirit) was consumed. During the two days the feast lasted I was nearly famished, for, although there was food, nobody would cook it, and the guests sustained themselves entirely on cauim and ipadú. At short intervals ipadú

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<sup>1</sup> See Mr. Cook's paper entitled "Staircase Farms of the Ancients" in The National Geographic Magazine, 29: 474-534. May, 1916.



was handed around in a large calabash with a tablespoon for each to help himself, the customary dose being a couple of spoonfuls. After each dose they passed some minutes without opening their mouths, adjusting the ipadú in the recesses of their cheeks and inhaling its delightful influences. I could scarcely resist laughing at their swollen cheeks and grave looks during these intervals of silence, which, however, had two or three times the excellent effect of checking an incipient quarrel. The ipadú is not sucked, but allowed to find its way insensibly into the stomach along with the saliva. I tried a spoonful twice, but it had little effect on me and assuredly did not render me insensible to the calls of hunger, although it did in some measure to those of sleep. It had very little of either smell or taste, and in both reminded me of weak tincture of henbane. I could never make out that the habitual use of ipadú had any ill results on the Rio Negro; but in Peru its excessive use is said to seriously injure the coats of the stomach, an effect probably owing to the lime taken along with it.

AYA-HUASCA, OR DEAD MAN'S VINE, BANISTERIA CAAPI.

Richard Spruce, in his Notes of a Botanist on the Amazon and Andes, describes a remarkable narcotic plant, the botanical identity of which he was the first to discover. It proved to belong to the genus *Banisteria*, and it is the only member of the family *Malpighiaceae* thus far known to possess narcotic properties. For its specific name he adopted the common name by which it was known in Brazil and Venezuela, *caapi*, signifying in the Tupi language "thin leaf."

*Banisteria Caapi* Spruce has a twining habit of growth. It has thinnish opposite leaves with oval-acuminate blades 6.4 by 3.3 inches in size with petioles scarcely an inch long. Its inflorescence is in the form of 4-flowered umbels. The flowers are composed of a 5-parted calyx and 5-clawed petals, 10 stamens, and 3 styles. The capsules are "muricato-cristate, prolonged on one side into a greenish white semi-obovate wing."

The lower part of the stem is beaten in a mortar with water, sometimes with the addition of a few slender roots of the *caapi-pinima*, an Apocynaceous twiner with red-veined leaves belonging to the genus *Haemadictyon*. When sufficiently triturated it is strained and enough water is added to it to make it drinkable. It forms a brownish-green infusion with a disagreeable bitter taste.

Mr. Spruce describes the ceremonial drinking of *caapi* at a feast held at a village above the first falls of the Rio Uaupés. It is accompanied by the greatest solemnity, and is preceded by the sound of the *botutos*, or sacred trumpets. On hearing these every woman seeks seclusion in a house with all possible haste; for merely to see one of these sacred instruments would be to her a sentence of death. The night was spent in dancing. Between the dances the young men partook of the drink, a few at a time. The formality attending the dispensing of it recalls that of the "black drink" ceremony of



our southeastern Indians, and the same is true of the taboos imposed upon the women, who were not permitted to touch or taste either the caapi here described or the black drink of our southeastern Indians, which will be described below.

In presenting the caapi the cupbearer runs quickly from the opposite end of the house with a small calabash containing about a tea-cupful in each hand, muttering "Mo-mo-mo-mo-mo" as he runs, and gradually sinking down until his chin nearly touches his knees, he presents one of the cups and then the other to the man for whom it is intended.

In two minutes or less after drinking it, its effects begin to be apparent. The Indian turns deadly pale, trembles in every limb, and horror is in his aspect. Suddenly contrary symptoms succeed; he bursts into a perspiration, and seems possessed with a reckless fury, seizes whatever arms are at hand, his *murucú*, bow and arrows, or cutlass, and rushes to the doorway, where he inflicts violent blows on the ground or the doorposts, calling out all the while, "Thus would I do to mine enemy (naming him by his name) were this he!" In about 10 minutes the excitement has passed off and the Indian grows calm, but appears exhausted. Were he at home in his hut he would sleep off the remaining fumes, but now he must shake off his drowsiness by renewing the dance.<sup>1</sup>

Spruce afterwards witnessed the use of this plant by the Indians inhabiting the northeastern Andes of Peru, and saw the plant itself growing in the villages of Canelos and Puca-yacu, inhabited chiefly by the Zaparos. Here it was called by the Quichua name *Aya-huasca*, which signifies "Dead man's vine." The following is a summary of what he learned concerning it at Puca-yacu:

*Aya-huasca* is used by the Zaparos, Angutéros, Mazánes, and other tribes precisely as I saw caapi used on the Uaupés, viz, as a narcotic stimulant at their feasts. It is also drunk by the medicine man, when called on to adjudicate in a dispute or quarrel, to give the proper answer to an embassy, to discover the plants of an enemy, to tell if strangers are coming, to ascertain if wives are unfaithful, in the case of a sick man to tell who has bewitched him, etc.

All who have partaken of it feel first vertigo, then as if they rose up into air and were floating about. The Indians say they see beautiful lakes, woods laden with fruit, birds of brilliant plumage, etc. Soon the scene changes; they see savage beasts preparing to seize them; they can no longer hold themselves up, but fall to the ground. At this crisis the Indian wakes up from his trance, and if he were not held down in his hammock by force, he would spring to his feet, seize his arms, and attack the first person who stood in his way. Then he becomes drowsy, and finally sleeps. If he be a medicine man who has taken it, when he has slept off the fumes he recalls all he saw in his trance, and thereupon deduces the prophecy, divination, or what not required of him. Boys are not allowed to taste *aya-huasca* before they reach puberty, nor women at any age, precisely as on the Uaupés.

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<sup>1</sup> Richard Spruce. *Notes of a Botanist on the Amazon and Andes*, 2: 419-420. 1908.



Villavicencio says (in his *Geografía de la Republica del Ecuador*, p. 373, 1858):

When I have partaken of aya-huasca, my head has immediately begun to swim; then I have seemed to enter on an aerial voyage, wherein I thought I saw the most charming landscapes, great cities, lofty towers, beautiful parks, and other delightful things. Then all at once I found myself deserted in a forest and attacked by beasts of prey, against which I tried to defend myself. Lastly, I began to come round, but with a feeling of excessive drowsiness, headache, and sometimes general malaise.

This is all I have seen and learned of caapi or aya-huasca. I regret being unable to tell what is the peculiar narcotic principle that produces such extraordinary effects. Opium and hemp are its most obvious analogues, but caapi would seem to operate on the nervous system far more rapidly and violently than either. Some traveler who may follow my steps with greater resources at his command will, it is to be hoped, be able to bring away materials adequate for the complete analysis of this curious plant.<sup>1</sup>

In the above account the description of the hallucinations caused by the narcotic caapi, or aya-huasca, a remarkable parallel will be found with similar effects of *Lophophora Williamsii*, the narcotic cactus of the Aztecs already described.

#### ILEX TEAS.

Among the important stimulants, or restoratives, of ancient America were tea-like infusions and decoctions prepared from several species of holly, or ilex—in southern Brazil and Paraguay, from *Ilex paraguariensis*, commonly known as yerba mate; in Ecuador, an ilex with much larger leaves, called guayusa; and in Florida, the Carolinas, and Texas, *Ilex vomitoria*, called cassine or yaupon, the source of the celebrated ceremonial “black drink.” All of these owe their stimulating virtues to an alkaloid, which has been identified with caffeine. Prepared as a simple infusion by pouring hot water on the leaves, as in brewing the yerba mate, the effect is very much like tea itself. When boiled for a long time, as is the custom with the guayusa and cassine, the decoction has the effect of an emetic. It is interesting to note that in localities so widely remote as Ecuador and Florida the aboriginal inhabitants habitually used decoctions of ilex as an emetic and believed themselves benefited by vomiting. That the stimulating properties of two very closely allied plants like *Ilex paraguariensis* and *I. vomitoria* should have been independently discovered by tribes so widely separated as the Guaranis of South America and the Creeks of Florida is also remarkable, and especially in view of the fact that the leaves of the plants in question were subjected by the natives to a similar preliminary process of scorching before they were used. Another noteworthy feature connected with the black drink is the taboo imposed upon women by various tribes

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<sup>1</sup> Spruce, op. cit., p. 424–425.



of the southern United States in connection with its ritual, which has remarkable parallels in the customs of various South American tribes in connection with their rituals accompanying the preparation and use of certain narcotics.

ILEX PARAGUARIENSIS, THE YERBA MATE OF PARAGUAY.

The use of the leaves of *Ilex paraguariensis* by the Guarani Indians and their neighbors must have begun centuries before the discovery. In pre-Columbian times the plant was known only in its wild state, but after the arrival of the Jesuits its cultivation was successfully undertaken in their missions in Paraguay and Brazil. When they were expelled the plantations went to ruin, but the industry was resumed at a later date and is now of great commercial importance. According to a bulletin of the Pan American Union issued in May, 1916, the value of the prepared leaves exported from Brazil amounts annually to about \$8,727,000. In 1915 Argentina received from Brazil about 48,000 tons and 3,500 tons from Paraguay. The plantations of Paraguay were formerly guarded with jealous care. Bonpland, the companion of Humboldt, was imprisoned for many years by the Paraguayan Government for attempting to export living plants and seeds from Paraguay to Europe. For the methods of propagating, cultivating, gathering, curing, and packing yerba mate the reader is referred to the Pan American bulletin cited above.

The writer first encountered the custom of drinking Paraguay Tea in Uruguay, on an expedition with the eminent botanist, Don José Arechavaleta and his botany class of the National College of Medicine, October 1, 1886. The locality visited was an estancia, or cattle ranch, not far from the railway station of Santa Lucia. He recalls with pleasure the band of young students, many of them wearing the picturesque costume of the gauchos, or cowboys of the pampas—ponchos of guanaco wool, broad-brimmed hats, knives thrust in embossed silver scabbards, and silver spurs. At the station horses were awaiting many of them with silver-mounted bridles and saddles with heavy silver stirrups. After filling portfolios of drying paper with the beautiful spring flowers of the pampa (there were acres and acres of scarlet verbenas) yerba mate was served in gourds (*Cucurbita lagenaria*). These gourds, called mate, or mati in the Quichua language, give to the plant its name. The infusion was sucked up scalding hot through a bombilla, a silver tube terminating at the lower end in a hollow perforated bulb, which served as a strainer. A single gourd was passed around a circle composed of gauchos and students, each taking a suck at the bombilla in turn. To have hesitated to follow their example would have caused resentment. The infusion was not unlike tea, but more astringent, and too bitter for



the taste of a novice. Its effects were undoubtedly stimulating, very much like strong tea. During a continuation of his cruise the writer encountered yerba mate at Punta Arenas, on the Strait of Magellan, and at various ports along the coast of Chile; and later he found it offered for sale in the markets of Bolivia.<sup>1</sup>

*Ilex paraguariensis* is an evergreen shrub or small tree with short, petioled, glossy, oblong leaves 15 to 20 cm. long, acute or rounded at the apex and wedge shaped at the base, with the margin remotely toothed. The inflorescence consists of clusters of small flowers growing from the leaf axils. The small globose fruits usually contain four hard nutlets. The plant grows in Paraguay, especially at Villa Real, above Asuncion, and at Villa San Xavier, between the Rivers Uruguay and Parana. In Brazil the principal localities in which it is cultivated are in the State of Parana, Santa Catharina, and Rio Grande do Sul. The prepared yerba differs in quality. The more common kind, called guazu, is produced by pounding the scorched leaves in mortars in the earth. In preparing a finer grade, called caa mirim, the leaves are carefully chosen and deprived of their midrib before roasting, and the caa-cuys of Paraguay, the finest of all, is prepared from the scarcely expanded buds and young leaves.

#### THE GUAYUSA ILEX OF ECUADOR.

An *Ilex* resembling the yerba mate, but having much larger leaves, was found by Richard Spruce in Ecuador, where it was used by the Zaparo and Jibaro Indians inhabiting the eastern side of the equatorial Andes. It was called by them guayusa. Spruce could not satisfy himself as to its specific identity, for he was unable to secure either flowers or fruits for comparison with herbarium material. Botanists have not all agreed as to the delimitations of the various species of South American *Ilex*. Some have treated various forms, distinguished by the size of the leaves and other differences, as varieties of a single species; others have regarded them as botanically distinct. According to Miers several distinct species are used as a source of tea, including *Ilex curitibensis*, *I. gigantea*, *I. ovalifolia*, *I. humboldtiana*, and *I. nigropunctata*. The genus needs further critical study.

Spruce found the guayusa planted near villages and on the sites of abandoned settlements, at elevations as great as 5,000 feet above sea-level. In 1857 he observed a group of these trees in the gorge of the Rio Pastaza, below the town of Baños, which were supposed to have been planted before the conquest. He describes them as "not

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<sup>1</sup> See Safford, W. E. "The flora of Banda Oriental." Bull. Torrey Botanical Club, 14: 159-164. 1887.



unlike old holly trees in England, except that the shining leaves were much larger, thinner, and unarmed." During his travels he found guayusa leaves to be a good substitute for tea or coffee. As prepared by the Jibaros Indians, however, the infusion is so strong that, like the black drink of our own Indians, it acts as an emetic. The guayusa pot, carefully covered up (like the pots in which the black drink was brewed), was kept simmering on the fire throughout the night. On awakening in the morning the Indian would drink enough of the guayusa to make him vomit, his notion being he would be benefited by the operation.<sup>1</sup> It is interesting to note that many Indian tribes both of North and South America practiced certain ceremonies attended by purging or vomiting, believing that thereby they would be freed from evil.

#### THE BLACK DRINK OF FLORIDA AND THE CAROLINAS.

(Plates 14 and 15.)

*Ilex vomitoria* takes its specific name from the emetic effect of its concentrated infusion, which under the common name of "black drink" was used ceremonially by several tribes of our southern Indians. Mark Catesby, in his *Hortus americanus* (1763) speaks of it as follows:

The esteem the American Indians have for this shrub, from the great use they make of it, renders it most worthy of notice. They say its virtues have been known among them from the earliest times, and they have long used it in the same manner as they do at present. They prepare the leaves for keeping by drying or rather parching them in a pottage pot over a slow fire, and a strong decoction of the leaves thus cured is their beloved liquor, of which they drink large quantities, both for health and pleasure, without sugar or other mixture. They drink it down and disgorge it with ease, repeating it very often and swallowing many quarts. They say it restores lost appetite, strengthens the stomach, and confirms their health, giving them agility and courage in war. It grows chiefly in the maritime parts of the country, but not farther north than the capes of Virginia. The Indians of the seacoast supply those of the mountains therewith and carry on a considerable trade with it in Florida, just as the Spaniards do with their South Sea tea from Paraguay to Buenos Aires. Now, Florida being in the same latitude north as Paraguay is south, and no apparent difference being found on comparing the leaves of these two plants together, it is not improbable they may both be the same.

In South Carolina it is called cassena, in Virginia and North Carolina it is known by the name of yopon; in the latter of which places it is as much in use among the white people as among the Indians, and especially among those who inhabit the seacoast.

The earliest written account of the ceremonial use of *Ilex vomitoria* is contained in the narrative of the expedition of Cabeza de Vaca, who found it in use among the Cultachiches (1536), west of

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<sup>1</sup> Spruce, Richard. Notes of a Botanist on the Amazon and Andes, 2: 453. 1908.



the mouth of the Mississippi River. He described the plant as having leaves resembling those of an encina, or live oak. Its leaves, after having been toasted over the fire in an earthenware vessel were boiled for a long time, and the decoction poured into a vessel made of a half-gourd and stirred so as to make it foam. It was drunk boiling hot. While on the fire the vessel in which it was boiling was kept carefully covered;

and if by chance it should be uncovered, and a woman should come by in the meantime, they would drink none of it but fling it all away. Likewise while it was cooling and being poured out to drink, no woman was allowed to stir or make a motion, or they would pour it all out on the ground and spew up any which they might have drunk, while she would be severely beaten. All this time they would continue bawling out: "Who will drink?" whereupon the women, on hearing this call, became motionless, and were they sitting or standing, even on tip-toe, or with one leg raised and the other down, they dared not change their position until the men had cooled the liquor and made it ready to drink. The reason they gave for this is quite as foolish and unreasonable as the custom itself; for they said that if the women did not stand still on hearing the call some evil would be imparted to the liquor which they believed would make them die.

René de Laudonnière, the leader of the ill-fated Huguenot expedition to Florida (1564), noticed the use of the "black drink" as practiced by the Indians living at the mouth of the St. Johns River, Florida. Le Moine, his historian, wrote a narrative of the expedition, in which he mentions *cassine* leaves among the presents bestowed by the Indians upon the Frenchmen. Of the ceremonies accompanying its preparation and dispensing he gives the following account, accompanied by an illustration which is here reproduced (pl. 14). Unlike the Indians observed by Cabeza de Vaca, the Florida Indians did not exclude women from the ceremonies connected with its preparation, although neither they nor youths uninitiated into the dignity of manhood were permitted to partake of it.

The chief and his nobles are accustomed during certain days of the year to meet early every morning for this express purpose in a public place, in which a long bench is constructed, having at the middle of it a projecting part laid with nine round trunks of trees for the chief's seat. On this he sits by himself for distinction sake; and the rest come to salute him, one at a time, the oldest first, by lifting both hands twice to the height of the head and saying, "Ha, he, ya, ha, ha." To this the rest answer, "Ha, ha." Each as he completes his salutation takes his seat on the bench. If any question of importance is to be discussed the chief calls upon his *lauas* (that is, his priests), and upon the elders, one at a time, to deliver their opinions. They decide upon nothing until they have held a number of councils over it, and they deliberate very sagely before deciding. Meanwhile the chief orders the women to boil some *cassine*, which is a drink prepared from the leaves from a certain root and which they afterwards pass through a strainer.

The chief and his councilors being now seated in their places, one stands before him, and spreading forth his hands wide open, asks a blessing upon the chief and the others who are to drink. Then the cupbearer brings the



hot drink in a capacious shell, first to the chief, and then, as the chief directs, to the rest in their order in the same shell. They esteem this drink so highly that no one is allowed to drink it in council unless he has proved himself a brave warrior. Moreover, this drink has the quality of at once throwing into a sweat whoever drinks it. On this account those who can not keep it down, but whose stomachs reject it are not intrusted with any difficult commission or any military responsibility, being considered unfit, for they often have to go three or four days without food; but one who can drink this liquor can go for 24 hours afterward without eating or drinking. In military expeditions also the only supplies which they carry consist of gourd bottles or wooden vessels full of this drink. It strengthens and nourishes the body and yet does not fly to the head as we have observed on occasion of these feasts of theirs.

Accounts of the Black Drink ceremony are given by many other writers, including John Lawson, in his *History of Carolina* (1714); James Adair, in his *History of the American Indians* (1775); Bossu, in his account of the Allibama Indians; Bernard Romans, in his *Natural History of Florida* (1775); and William Bartram, in his *Travels in Florida* (1791).<sup>1</sup>

By the Catawba Indians this plant was called yaupon; by the Creeks it was known as assi-luputski, or "small leaves," which literally corresponds to the Guarani name (caa-mirim) of the finer form of *Ilex paraguariensis*, a most interesting coincidence.

The custom of drinking tea made of *Ilex vomitoria* was adopted by many of the white settlers of Florida, the Carolinas and Georgia, but it has not persisted. Similar drinks are still used by certain tribes of Oklahoma, in the ceremonies connected with their feast commonly called the busk. According to the statements of various authors *Ilex* leaves alone were used along the southeastern seacoast, but in other localities it is quite probable that other plants were added to or substituted for the infusion, especially the so-called Indian tobacco, *Lobelia inflata*, and the button snake root, *Eryngium aquaticum*, both of which were held in high esteem by many tribes of North American Indians.

*Ilex vomitoria* (pl. 15) is an evergreen shrub or small tree. Its small glossy leaves, likened by Cabeza de Vace to those of an encina or live oak, and by Lawson to box leaves, are deep green above and pale beneath, oblong, oval, or elliptical in form, and obtuse at the apex, with the margins crenate-serrate. Those of the upper branches are 1 to 2.5 cm. long, while those on the vegetative shoots are often larger and oblong-lanceolate in shape. Though this species has been confused with *Ilex Cassine* L. by several botanists the two species are easily distinguished by their leaves. Those of *Ilex Cassine* are usually much larger, more nearly resembling those of *I. paraguariensis*, but with the margins entire or few toothed. The small

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<sup>1</sup> See Hale, E. M., Bull. No. 14, Div. Bot., U. S. Dept. Agr. 1891.



white flowers of *Ilex vomitoria* are borne in axillary clusters having short smooth peduncles, and its flowers are distinguished from those of the allied species in having obtuse instead of acute calyx-teeth. In the pistillate flowers the 4 stamens are shorter than the petals, while in the staminate they are longer. The fruit is in the form of red globose drupes 5 or 6 mm. in diameter, usually containing 4 slightly ribbed nutlets. Plate 15 is the photograph of a specimen collected near Austin, Tex., May 27, 1904, by Mr. F. V. Coville, Botanist of the Bureau of Plant Industry.

#### GUARANÁ.

Guaraná is a substance somewhat resembling chocolate prepared from the bitter seeds of a Sapindaceous climber by certain tribes of Indians of Brazil and Venezuela. It owes its stimulating virtue to an alkaloid (guaranin) chemically allied to caffein. Like chocolate it is reputed to have aphrodisiac properties. In Venezuela it is known by the name of cupana. Although the plant from which it is derived is known as *Paullinia sorbilis*, a name applied to it by Martius, Spruce has shown that it is identical with the previously described *Paullinia cupana* of Humboldt, Bonpland and Kunth and that according to the rules of priority the latter name takes precedence.

Though normally a twining plant it is kept pruned in cultivation to the size of a currant bush. It has pinnate alternate leaves composed of 5 coarsely serrate leaflets, with the apical tooth retuse. The inflorescence consists of clusters of small white flowers growing in racemes from the axils of the leaves. The fruiting capsules are obovate to pyriform tapering at the base to a long neck or stipe and shortly beaked at the apex. When fresh they are yellow and tinged with red near the apex, with the thin pericarp smooth on the outside and woolly on the inner surface, 3-valved, but dehiscing only along two of the sutures. The solitary black glossy seed is nearly half covered by a white cup-shaped aril.

Martius gives a description of the process of making guaraná from the seeds of this plant by the Indians of the Rio Mauhé, Brazil. As prepared by them it is a very hard paste of a chocolate brown color almost devoid of odor. For use this paste is reduced to a fine powder and mixed with sugar and water to make a stimulating drink. The seeds, which mature in October and November, are removed from the capsules and dried in the sun until the fleshy white cups are in such a state as to be easily rubbed off with the fingers. They are then poured into a heated stone mortar, where they undergo a process of parching and are ground to a fine powder, which is mixed with water or exposed to the night dew and kneaded into a paste. When the process is finished a few seeds either whole or broken into fragments



are introduced and the whole is made up into sticks or cakes, usually cylindrical or spindle-shaped, about 5 to 8 inches long and weighing about 12 to 15 ounces. These sticks are then dried in the sun or by the fire and become so hard and resistant that it requires an axe to break them. They are then packed in broad leaves of banana-like plants and put into baskets or bags. If protected from moisture this paste will keep in good condition for several years. In the Province of Pará the jawbone of a fish called Piracurú, covered with sharp processes, is used as a rasp for grating it.

Humboldt and Bonpland state that in southern Venezuela the powdered seeds are mixed with mandioca flour, wrapped in plantain leaves, and allowed to ferment until it acquires a saffron-yellow color. This yellow paste, dried in the sun and diluted with water, is taken as a morning drink like tea or coffee. It is bitter, stimulating and tonic in its effects. Humboldt did not like its flavor, but Spruce, who drank it in the form of a cooling beverage prepared from the pure paste with cold water and sugar, liked its flavor and found that its effects were very much like those of tea. At Cuyabá it was served in taverns as a refreshing drink, and in various parts of South America Spruce found it to be a popular remedy for sick headache (hemicrania).<sup>1</sup>

#### CHOCOLATE.

(Plates 16 and 17.)

Chocolate, made from the seeds of *Theobroma cacao*, is undoubtedly of Central American origin. It was known to the inhabitants of Mexico and Central America long before the Discovery, and after the Conquest it soon found its way to Europe and to the most remote parts of the earth. No vestiges of the seeds or pods of cacao or any representation of them on funeral vases have been found in the prehistoric graves of the Peruvian coast region; and so rich are these graves in remains of fruits and vegetables as well as in representations of such objects in terra cotta that the inference is that cacao was unknown to the aboriginal inhabitants of that part of the world. Prescott's imaginary picture of the Peruvian coast adorned with plantations of cacao is wholly without foundation in fact.

Padre Cobo, in his *Historia del Nuevo Mundo*, tells of the high esteem in which cacao was held in Mexico:

This fruit is so highly prized by the Indians of Nueva España that it serves for money in that kingdom, and with it they buy in the markets and from traveling venders small objects, such as tortillas of maize, fruits, and vegetables; and I on the roads of that kingdom bought such things many times with cacao. Even in the city of Mexico they give as alms to the poor Indians two or three cacaos, as though they were money.

But the reason why these cacao-almonds are principally esteemed is for a drink called chocolate, which the Indians made of them and which now the

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<sup>1</sup> Spruce, Richard. Notes of a Botanist on the Amazon and Andes, 2: 448-453. 1908.



Spaniards prepare with greater neatness, care, and expense. It is of a dark-red color, with a foam which rises like scum and which is distasteful to newly arrived colonists and to those unaccustomed to drink it; but the people of the country are crazy for it. They regard chocolate as a delicacy, and Indians and Spaniards entertain with it the friends who come to their houses. In addition to the toasted and ground cacao seeds chocolate may contain many other ingredients, every one mixing with it those things which they fancy will improve its quality or flavor. But everybody usually puts in these five constituents: cacao, achiote (*Bixa orellana*), vanilla [the fruiting pod of an orchid called tlilxochitl, or "black flower," by the Aztecs], cinnamon [brought from the East Indies after the Discovery], and sugar [also an introduced product]. To these they add some other kinds of dried flowers [orejuela, or ear-flower, called xochinacaztli by the Aztecs], sesame, anise, chilli or aji (*Capsicum* pepper), and other things more or less according to their taste. In some parts of Central America (especially in Nicaragua) they make use of a preparation of ground cacao mixed with toasted and ground maize, which when mixed with water yields a delightful and nutritious drink called tiste \* \* \*. The most highly prized cacao in New Spain is that which is grown in the Province of Soconusco and in the diocese of Guatemala; and the largest is that of the diocese of Venezuela, or Caracas \* \* \*. Just as the almonds of Chachapoyas have bats for enemies, so the cacao has monkeys, which are bred in the large trees which shelter it, and they devour as much as they can.<sup>1</sup>

Plate 16 is the photograph of a trunk of cacao growing near the village of Coahuila, in the State of Chiapas, southern Mexico, taken in January, 1907, by Mr. Guy N. Collins of the United States Department of Agriculture, showing the peculiar habit of fruiting of the tree. In this region the cultivation of cacao is more successful and lucrative than in any other part of tropical America visited by Mr. Collins. Plate 17, which shows a slightly reduced pod from the same tree, will give some idea of the enormous size of the pods. The seeds are seen enveloped in their soft fleshy white aril. At this locality the trees produce almost continuously from November to June, and during this interval the pods are gathered three times.

As soon as the seeds are removed from the pods they are washed by placing them in shallow baskets partly submerged in water and rubbing them against the bottom and sides of the baskets, forcing the pulp through the meshes. The seeds are then sun dried, the quicker the better, it is thought. This unfermented product would not command a high price in the European or American markets, but it is said that the Mexicans do not demand a fermented bean. \* \* \* From a few miles below Pichucalco to within a few miles of San Juan the banks of the river are almost continuously lined with cacao plantations, a great part of which is shaded with rubber. \* \* \* About 1,500 tons of cacao pass through San Juan annually, valued at about \$1,250,000. In spite of the enormous amount of cacao produced in Mexico and an import duty of 30 cents per kilo, cacao is still imported from Guayaquil. In the fine cacao lands above San Juan the growing of this commodity is the most lucrative agricultural operation with which we are familiar.

<sup>1</sup> Padre Cobo. Historia del Nuevo Mundo, 2: 63-64, ed. Jiménez de la Espada, 1891.



The primitive custom of using cacao for currency still prevails in the State of Chiapas, especially in the city of Tuxtla and its vicinity.

A common expression for cheap articles in the market here is that they sell for so many a cinco. This originally meant 5 cacao beans; but to allow for the fluctuating value of the cacao, a cinco actually consists of from 2 to 5 seeds, but the ratio of exchange will be uniform throughout the market.

Mr. Collins found three distinct types of cacao at Tuxtla: Small plump beans from Tabasco; flatter beans that had been rolled in ashes from Quechula; and cacao pataxte, the seeds of *Theobroma bicolor*. The latter parched and ground are used together with maize for making a drink called "posol" (from pozolli, foaming). Another drink called "tascalate" (from tezcalli, one who grinds maize or some other substance on a stone metlatl) was composed of ground cacao mixed with ground parched corn and almonds. It was carried in the form of powder by travelers on long trips when there was little opportunity of obtaining food, and made into an agreeable and nourishing drink by the addition of sugar and water.<sup>1</sup>

#### BOTANICAL DESCRIPTION.

*Theobroma cacao* is a small tree with a bare stem which generally rises to a height of about 2 meters before branching and reaches a height of 5 or 6 meters. Sometimes, however, under good conditions of moisture, soil, and situation it grows higher. The tree is cauliflorous; that is, the flowers spring forth from the trunk and older branches. Leaves large, undivided, smooth, broad, pointed, and of a thin texture, of a reddish color and hanging limp from the branches when young, but soon turning green and becoming firm; flowers produced from adventitious buds under the bark, usually at the "eyes," or points marked by the scars of fallen leaves, small, growing in clusters or solitary, usually only one of a cluster developing into fruit; calyx 5-parted, often of a pinkish color; petals 5, yellowish, concave at the base and having a straplike appendage at the tip; stamens 10, united at the base into a cup, 5 without anthers and the other 5 alternating with them bearing 2 double-celled anthers each; style threadlike, terminating in a 5-cleft stigma; fruit somewhat like a cucumber in shape, 15 to 25 cm. long, yellow or reddish, longitudinally ribbed, the rind thick and warty, leathery and tough, not splitting when ripe, 5-celled, and containing many seeds in a soft butterlike pulp of a pleasant sweetish-acid flavor; seeds compressed, somewhat almond shaped, with a thin, pale, reddish brown, fragile skin or shell covering an oily, aromatic, bitter

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<sup>1</sup> The above information was derived from Mr. Collins's field notes. See his abridged report: "Notes on Southern Mexico," by G. N. Collins and C. B. Doyle, of the U. S. Department of Agriculture, in the National Geographic Magazine, March, 1911, pp. 301 to 320.



kernel, which consists mostly of the crumpled cotyledons. If taken from the pod the seed soon loses its vitality. It is consequently difficult to transport it to distant countries unless in a germinating condition or in ripe pods, which, if kept cool, will last 10 days or perhaps 2 weeks.

In gathering the pods care is taken to cut the stalks neatly half way between the pod and the tree, so as not to tear the bark, as is often done if the pod is removed by twisting; for it is in the bark at the base of the old stalk that adventitious buds issue which produce the ensuing crop. As a rule only one or two of the flowers in each cluster develop pods. In many countries seeds are usually subjected to a process of sweating or fermenting, by means of which the flavor is developed. Sometimes this process takes place in holes or trenches in the ground, after which the seeds are dried. Plantations of cacao were visited by the writer in the French Antilles, on the island of Trinidad, in the vicinity of Caracas, and near Guayaquil. From the latter place great quantities of cacao are exported. In Mexico he witnessed the preparation of chocolate by grinding the beans into a paste on a stone metlatl just as maize is ground for making tortillas; and on the Pacific coast of Central America he was regaled with delicious tiste made of ground cacao and parched maize and served in gourds (the fruit of *Crescentia cujete*). On the island of Guam, where cacao culture was introduced from Mexico, the Mexican metlatl is used. Here the beans, after having been carefully cleaned, are usually dried without fermentation and kept until required for use. They are then toasted like coffee, ground on the family metlatl, and made at once into chocolate. Chocolate made from newly toasted and ground beans is especially rich and aromatic. Sometimes more than is required for immediate use is prepared with the addition of a little flour or arrowroot, but without spices, and made into balls or lozenge-shaped disks large enough for a single cup of chocolate. Thus prepared it has a fine flavor and since none of the oil is removed it is very rich. The natives of the island scorn imported chocolate, declaring that it tastes like medicine.

It is interesting to note that the alkaloid theobromine, which is the active principle of cacao, is also found in cola, which plays almost as important a rôle in certain parts of Africa as cacao in tropical America. More interesting still is the fact that this is almost identical with the alkaloids found in *Paullinia cupana* and the American *ilexes* described in this paper, and in tea and coffee. But while the *ilexes* and tea and coffee are only stimulants, chocolate is both stimulant and food. Theobromine is now valued in medicine, especially for use as a diuretic. Its physiological effects are very similar to those of caffeine.



## SUMMARY.

1. The principal narcotic plants and stimulants of ancient America were tobacco, cohoba, the red bean, peyotl, ololiuhqui, jimson weed, huaca-cachu (a tree *Datura*), coca, aya-huasca, yerba-mate, cassine, guaraná, and cacao. Divine attributes were ascribed to them. They were used in divination, in medicine, and in ceremonials, and in many cases were carried by the Indians as safeguards or amulets to insure success in warfare and the chase.

2. Tobacco, the most important of these plants, is now extensively cultivated in both hemispheres and its use is world wide. The jimson weed (*Datura stramonium*) is now important as a source of atropine, and coca (*Erythroxylon Coca*) as the source of cocaine. The most important stimulants are the yerba-mate (*Ilex paraguariensis*) the leaves of which are known as Paraguay tea, and cacao (*Theobroma Cacao*), the seeds of which are made into chocolate and cocoa.

3. Of less importance but of possible medicinal value are peyotl (*Lophophora Williamsii*) identified as the "divine flesh" or teonancatl of the Mexicans, and the ololiuhqui (*Datura meteloides*), still extensively used by Indians of Mexico and the United States; huaca-cachu (*Brugmansia sanguinea*) of Peru; and aya-huasca (*Banisteria caapi*) of Brazil and Venezuela. Cassine (*Ilex vomitoria*) of the southern United States, which has the same properties as its Paraguayan congener, may prove to be valuable as a refreshing tea, and guaraná (*Paullinia cupana*) as the source of a drink resembling chocolate. The red bean, or frijolillo, of Texas (*Broussonetia secundiflora*), though possessing a narcotic alkaloid, is not used commercially and its use among our Indians is now very limited. Cohoba (*Piptadenia peregrina*), the seeds of which were used by the aboriginal Haitians and are still used by many Indians of the tributaries of the great rivers of South America as the source of a narcotic snuff, remains chemically unknown, though known and reported by the companions of Columbus.

4. In view of the shortage of medicinal alkaloids resulting from the present war it is suggested that investigations be made to determine the nature of the properties of these less-known narcotics, with a view to their utilization as substitutes for others now recognized in the standard pharmacopœias.





INFLORESCENCE OF NICOTIANA TABACUM, THE PICIETL OF MEXICO, THE PETUN OF BRAZIL.





NICOTIANA TABACUM: LEAF CHEWED BY THE ANCIENT MEXICANS TOGETHER WITH LIME,  
AND CALLED BY THEM TENEXIETL.





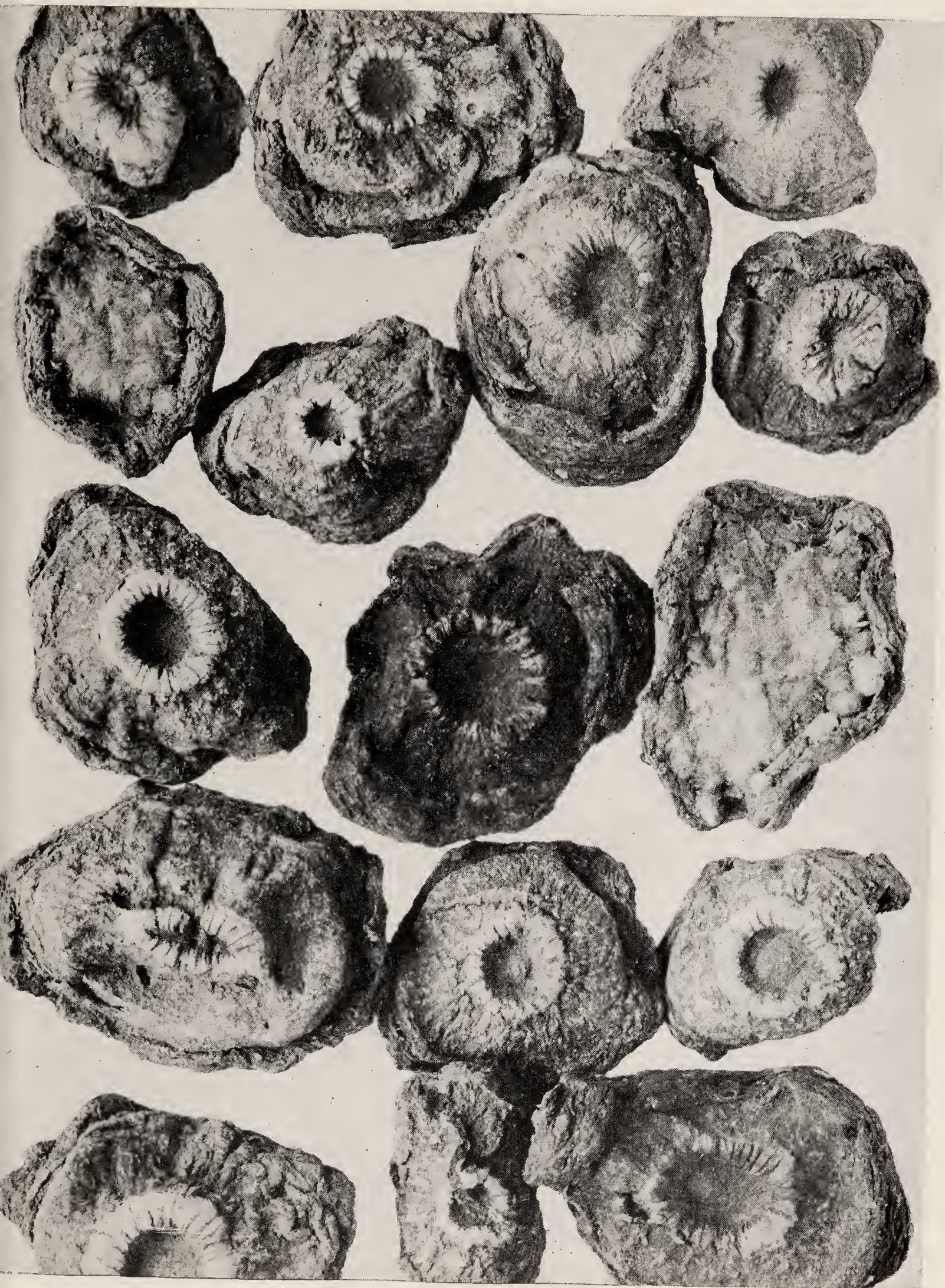
PIPTADENIA PEREGRINA, THE SOURCE OF THE NARCOTIC COHOBA SNUFF OF THE ANCIENT HAYTIANS. NATURAL SIZE.





BROUSSONETIA SECUNDIFLORA ORTEGA (SOPHORA SECUNDIFLORA LAG.); THE PLANT YIELDING THE NARCOTIC MESCAL BEAN OF NORTHERN MEXICO AND SOUTHWESTERN UNITED STATES.





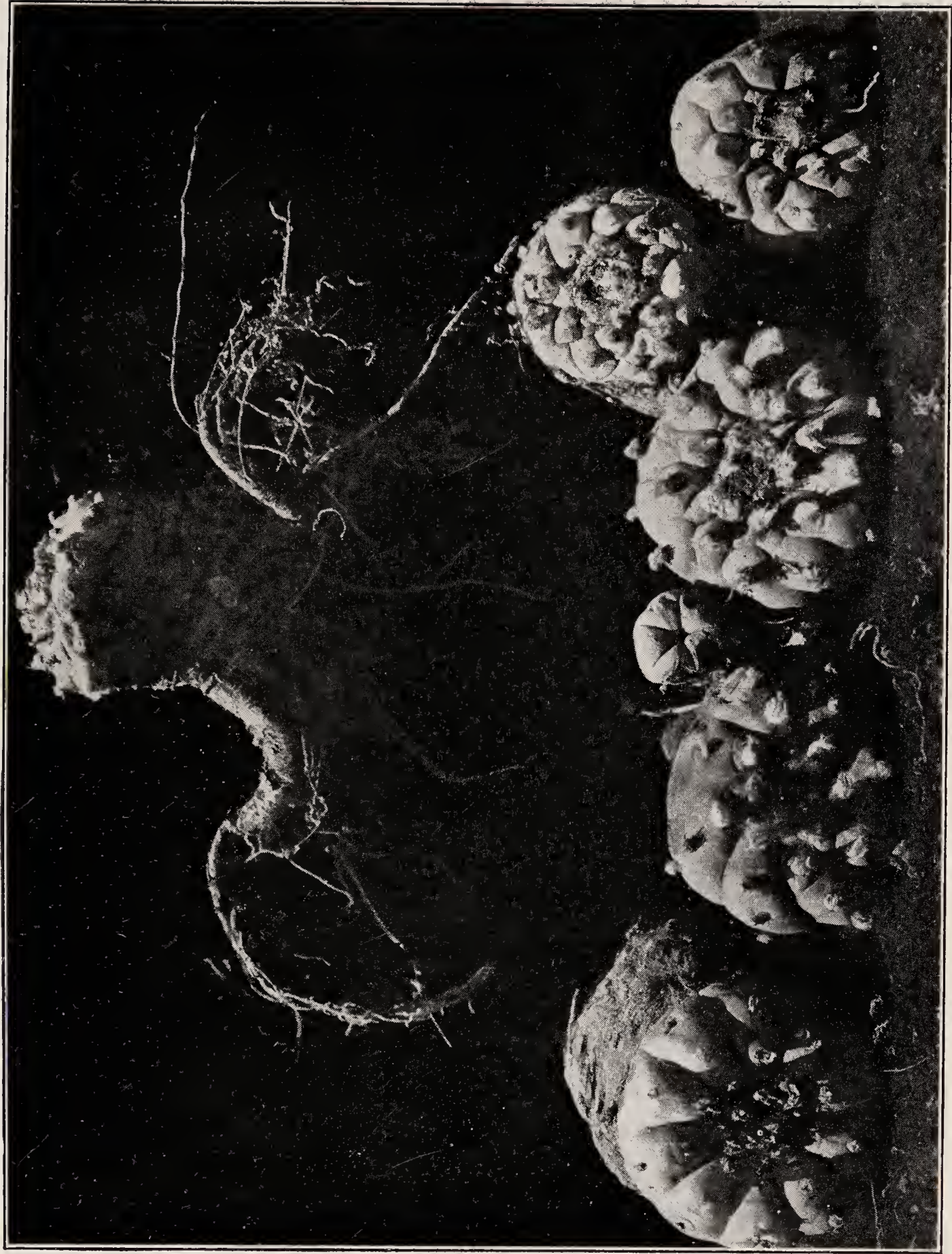
DISKS OF *LOPHOPHORA WILLIAMSII*, CALLED "SACRED MUSHROOMS" (TEONANACATL) BY THE ANCIENT MEXICANS.





DEVIL'S ROOT (*LOPHOPHORA WILLIAMSII*).





LOPHOPHORA WILLIAMSII, A NARCOTIC CACTUS; THE PEYOTL, OR TEONANACATL, OF THE AZTECS.

Photographed by F. E. Lloyd in northern Zacatecas.





DATURA METELOIDES, A CEREMONIAL NARCOTIC OF THE ANCIENT MEXICANS, ZUÑIS, AND CALIFORNIA INDIANS. TWO-THIRDS NATURAL SIZE.





DATURA METELOIDES, NARCOTIC PLANT USED BY THE ANCIENT AZTECS, ZUÑIS, AND CALIFORNIA INDIANS AS AN INTOXICANT AND HYPNOTIC. NATURAL SIZE.





THE JAMESTOWN WEED, *Datura stramonium* L., WHICH INTOXICATED THE BRITISH SOLDIERS SENT TO QUELL BACON'S REBELLION. NATURAL SIZE.





TREE DATURA (*BRUGMANSIA SANGUINEA*), USED AS A NARCOTIC BY THE PRIESTS OF  
THE TEMPLE OF THE SUN.





POUCH CONTAINING COCA LEAVES FROM PREHISTORIC PERUVIAN GRAVE, TOGETHER WITH GOURD CONTAINING LIME.





ERYTHROXYLON COCA, THE SOURCE OF COCAINE. PHOTOGRAPH OF SPECIMEN COLLECTED AT SANTA ANA, PERU, BY O. F. COOK.





*P. C. Gamble after Le Moyne (1564)*

BLACK DRINK CEREMONY AS PERFORMED IN NORTHERN FLORIDA, AFTER LE MOYNE (1564).





*ILEX VOMITORIA*, THE SOURCE OF THE BLACK DRINK OF THE INDIANS OF FLORIDA AND THE CAROLINAS. SPECIMEN COLLECTED NEAR AUSTIN, TEX., MAY 27, 1904, BY FREDERICK V. COVILLE. NATURAL SIZE.





THEOBROMA CACAO, THE PLANT FROM WHICH CACAO IS OBTAINED. SPECIMEN GROWING IN THE STATE OF CHIAPAS, MEXICO. PHOTOGRAPHED BY COLLINS AND DOYLE.





CACAO POD, SHOWING SEEDS SURROUNDED BY FLESHY WHITE ARIL. SPECIMEN FROM TREE SHOWN ON PRECEDING PLATE.











